Scenario analysis of corporate e-learning

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ABSTRACT OF THE
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E-learning has advanced to the frontier of future learning as a broad spectrum of technologies that are used to create, deliver, manage and assist learning. Corporations have adopted e-learning in an effort to addresses the challenges of modern corporate learning and development in the digital age. A complex multifaceted e-learning industry has emerged to cater to these versatile learning approaches and technologies. As the e-learning industry evolves, it is important to understand what the underlying factors are that drive change. This thesis uses the most significant trends and uncertainties influencing the industry to examine scenarios for corporate e-learning over a time frame spanning the next 10 years.

The literature review establishes an understanding of past changes and of the current state of the e-learning industry. Expert interviews helped in establishing a deeper knowledge and gaining further information. Key trends and uncertainties are identified with the help of the PEST framework, so that a broad range of macro-environmental factors are considered. Four alternative scenarios for corporate e-learning are developed from the key trends and uncertainties by using Shoemaker's scenario planning method. Lastly, the corporate e-learning scenarios are analyzed and further evaluated from the perspective of the key stakeholder of the thesis.

The scenarios reveal a common factor. E-learning niches, built on distinct competencies or specialization in certain technology, are less prone to the effects of the key uncertainties. The key uncertainties in the thesis are concerned with corporate e-learning in-house sourcing and the emergence of supplier power positions. Overall, the results of the thesis establish a basis for further internal strategic thinking for the key stakeholder.

Keywords: e-learning; scenario planning; corporate training; learning and development;

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E-oppimista pidetään monesti oppimisen tulevaisuutena. E-oppiminen on kehittynyt vuosien varrella. Se mielletään nykyisin eri teknologioina, joilla pyritään luomaan, toteuttamaan, hallinnoimaan sekä avustamaan oppimista. Yritykset ovat omaksuneet e-oppimisen osana henkilöstön kehittämistä tavoitteena vastata modernin koulutuksen haasteisiin digitaalisella aikakaudella. E-oppimisen ympärille onkin syntynyt monimuotoinen toimiala tyydyttämään yritysten erilaisia koulutustarpeita ja mieltymyksiä.

E-oppimistoimialan kehittyessä on tärkeätä ymmärtää taustalla vaikuttavat tekijät, jotka ajavat toimialan muutosta. Tämä diplomityö tarkastelee e-oppimistoimialaan vaikuttavia tekijöitä trendien ja epävarmuuksien muodossa, keskittyen e-oppimiseen yrityksissä. Työssä luodaan merkittävimpien trendien ja epävarmuuksien avulla yritysten e-oppimisen skenaariot 10 vuoden ajanjaksolle.

Työn kirjallisuuskatsauksessa tarkastellaan menneisyyden muutoksia, sekä nykymarkkinoiden tilannetta, jolla luodaan perusta alan muutosten ymmärtämiselle. Lisää tietoa toimialasta ja sen kehityksestä kerätään asiantuntijahaastatteluiden kautta. Merkittävimpien trendien ja epävarmuuksien tunnistamisen apuna käytetään PEST-viitekehystä, jotta makroympäristöön vaikuttavat tekijät huomioidaan mahdollisimman laaja-alaisesti. Merkittävimpien trendien ja epävarmuuksien avulla luodaan neljä vaihtoehtoista skenaarioita yritysten e-oppimiselle käyttäen Schoemakerin skenaariosuunnittelumetodia. Viimeisenä yritysten e-oppimisskenaariot analysoidaan ja arvioidaan diplomityön pääsidosryhmän perspektiivistä.

Skenaariot välittävät yhtenäisen piirteen. Kapeat markkinasegmentit, jotka rakentuvat erillään olevien pätevyyksien, sekä teknologisen erikoistumisen pohjalle ovat vähemmän alttiita merkittävimpien epävarmuuksien vaikutuksille. Merkittävimmät epävarmuudet koskevat yritysten sisäistä e-oppimistuotantoa, sekä vaikutusvaltaisessa asemassa olevien toimittajien syntyä. Kaiken kaikkiaan tulokset luovan perustan pääsidosryhmän strategiselle ajattelulle.

Avainsanat: e-oppiminen; skenaarioanalyysi; yrityskoulutus; henkilöstön kehittäminen

Preface

This thesis was funded by Upknowledge. The work was done for the fulfillment of the Master of Science degree from the Aalto University School of Electrical Engineering under the supervision of Professor Heikki Hämmäinen.

First, I would like to thank Professor Heikki Hämmäinen for providing me with valuable guidance, insights and feedback throughout the thesis work. I am grateful to all of the experts that participated in the interviews and kindly shared their extensive knowledge with me. Without your contribution this thesis would not have been possible.

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Contents

Acronyms and terms

Adaptive learning	Learning and training systems that adapt to the unique learning needs of an individual. For example, intelligent tutoring systems that utilize machine learning.
ADL	Advanced Distributed Learning
AICC	Aviation Industry Computer-Based Training Committee
AR	Augmented reality
CAI	Computer-assisted instruction
CBT	Computer-based training
CERN	European Organizations for Nuclear Research
CMC	Computer-mediated communication
DARPA	Defense Advanced Research Projects Agency
Economies of scale	Cost advantages that arise from an increase of volume that drives down per-unit fixed costs
Economies of scope	Cost advantages that arise from increasing product variety when the products share a common asset
Experience API	E-learning software specification that is used to track learning experiences.
Gamification	Adding game like components to into non-game contexts.
HR	Human resource management
HTML	Hypertext Markup Language
HTTP	Hypertext Transfer Protocol
IaaS	Infrastructure-as-a-service (cloud computing service model)
ICT	Information and communications technology
IEEE LTSC	Institute of Electrical and Electronics Engineers Learning Technology Standards Committee
ILT	Instructor-led training
Immersive learning	Learning through the use of approaches, such as games, simulations and virtual worlds.
IMS-LTI	IMS Global Learning Consortium Learning Tools Interoperability
L&D	Learning and development
LMS	Learning Management System
LRS	Learning Record Store
Machine learning	Field of computer science that studies pattern recognition and computational learning theory in artificial intelligence.

MOOC	Massive Open Online Course
OBI	Open Badge Infrastructure
PaaS	Platform-as-a-service (cloud computing service model)
PC	Personal computer
PEST	Political, Economic, Social and Technological (framework for environmental scanning)
PLATO	Programmed Logic for Automatic Teaching Operations
SaaS	Software-as-a-service (cloud computing service model)
SCORM	Shareable Content Object Reference Model
Serious games	A game that is designed for other purposes than pure entertainment, such as education and training.
TCP/IP	Transmission Control Protocol / Internet Protocol
Tin Can API	Project name for Experience API.
VLE	Virtual learning environment
VoIP	Voice over Internet Protocol
VR	Virtual reality
W3C	World Wide Web Consortium
WBL	Web-based learning
WWW	World Wide Web

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1 Introduction

1.1 Background and motivation

E-learning, formerly a simple term used to refer to learning by computer-based training materials, has now advanced to the frontier of future learning as a broad spectrum of technologies. The spread of information and communications technology (ICT) continues to connect people around the world. This has allowed e-learning to spread to a global audience. Corporations world-wide have increased the use of e-learning in corporate learning and development over the years. Rosenberg (2001) highlights that e-learning offers corporations many valuable benefits and addresses the challenges of modern corporate learning and development in the digital age.

Although e-learning is seen as an important component of future professional development, it is not only about transitioning from traditional training to e-learning, as history has shown. The rapid expansion of the e-learning industry at the turn of the century and the setbacks that followed bring us to a place in time now where many of the past obstacles have been overcome. Today, the combination of technology and learning are providing exciting opportunities for all.

> *"Social, technological, and economic drivers are transforming education around the world. As globalization encompasses local economies like never before, the development of a skilled workforce becomes a genuinely international concern. And as human capital becomes the chief source of economic value, education and training become lifelong endeavors for the vast majority of workers."*
>
> - *Peter J. Stokes, Eduventures.com, 1999* (Urdan, Weggen 2000)

The quote above by Peter Stokes in 1999 is still very topical in the world of today. The fast-paced evolution of modern technologies, short life of knowledge and efforts to drive competitive advantages in corporations drive the need for employees to continuously learn and keep their skills up to date. The concept of lifelong learning is taking the spotlight in both professional and personal learning. E-learning and the vast range of technologies surrounding the field are seen as enablers of this transition.

E-learning is evolving continuously in tandem with innovative technologies that can be used to create, assist, support and deliver the new age of learning over internet technologies. As a result, a complex multifaceted e-learning market has emerged to cater to these versatile learning approaches and technologies. The industry drives forward with no imminent endpoint. As the e-learning market evolves it is important to understand what the underlying factors are that drive this change. Pursuing new opportunities in the industry is always a risk, but stagnating will also prove detrimental. Examining underlying drivers of the e-learning industry will help key stakeholders broaden their perspectives and help analyze future opportunities.

Scenario planning is used to understand the evolution of the corporate e-learning ecosystem. The ecosystem perspective not only considers entities such as customers and suppliers, but all organizations that interact within the e-learning market, such as

standardization bodies and other stakeholders. All of these industry stakeholders, their relationship networks and interaction create the e-learning ecosystem. Scenario planning is used to gain a perspective that can help make sense of a complex ecosystem with various forces of change and underlying uncertainties. This thesis is carried out for Upknowledge, headquartered in Helsinki, Finland.

1.2 Research question and objectives

The objective of the thesis is to build and analyze possible future e-learning scenarios through the most significant trends and uncertainties that shape the evolution of the corporate e-learning ecosystem. The e-learning ecosystem (i.e. the multifaceted e-learning market and various stakeholders) contains both opportunities and challenges for suppliers. Maintaining agility and the ability to respond to the market are paramount, as is minimizing tunnel vision. These topics are addressed by investigating the e-learning ecosystem from a technological and business point of view as well as examining how e-learning may evolve in corporate learning and development contexts.

Based on the objectives, the following research questions were developed to guide the thesis work:

R1. What are the trends and uncertainties that shape the future of corporate e-learning?

R2. What are the scenarios for corporate e-learning over the next 10 year time frame?

R3. What are the opportunities in which corporations will utilize outsourced services for learning and development?

1.3 Scope

The research questions already limit the scope of the thesis to a certain extent. Further focus was added due to the complexity of the industry and e-learning terminology. In an attempt to limit the complexity of the thesis, the scope was limited to e-learning in corporate learning and development. All e-learning corporate sector customers, whether small businesses or organizations, are referred to as corporations in this thesis

The thesis focuses on e-learning in the general technological domain. E-learning is used as a general term for the technologies that are an integral part of the global e-learning market. There is varied emphasis on different technologies in the market, but not every technology is considered individually due to the sheer immensity of the market. Establishing trends and uncertainties through literature and expert interviews helped guide the scope of technologies. In addition, other macro-environment factors, specifically political, economic and social factors are considered as a part of the thesis. However, the thesis does not take the pedagogical domain of e-learning in consideration. This includes topics, such as instructional design which was left out of the scope of the thesis.

The thesis work considers global scenarios. However, implications of the scenarios are discussed from the perspective of the key stakeholder. The thesis is conducted with no limits to a certain corporate customer segment, as the key stakeholder operates with a

multitude of businesses, organizations and corporations in a broad range of industries. The time frame of this thesis is set to ten years, from 2016 to 2026.

1.4 Research methods

The research methods utilized in this thesis are listed below.

1. Literature review

   To address the research questions, a literature review was conducted to gather sufficient background information about the corporate e-learning ecosystem. Information was gathered on the general historical developments of e-learning to establish an understanding of the historical changes in the industry. Furthermore, literature including industry reports, research papers, future forecasts and news articles were reviewed to establish an understanding of the current state of corporate learning and development practices as well as of the corporate e-learning ecosystem. The literature review is used to gain a basis of understanding for the trends and uncertainties of the industry.

2. Expert interviews

   Interviews were organized with experts familiar with the e-learning industry to improve understanding of the e-learning ecosystem and identify key trends and uncertainties. The PEST (political, economic, social and technology) analysis framework is used as a guideline for categories in which trends and uncertainties are searched for.

3. Scenario planning

   The findings of the literature review and expert interviews are used as a basis for the scenario planning method.

1.5 Structure of thesis

The structure of the thesis is shown in figure 1.

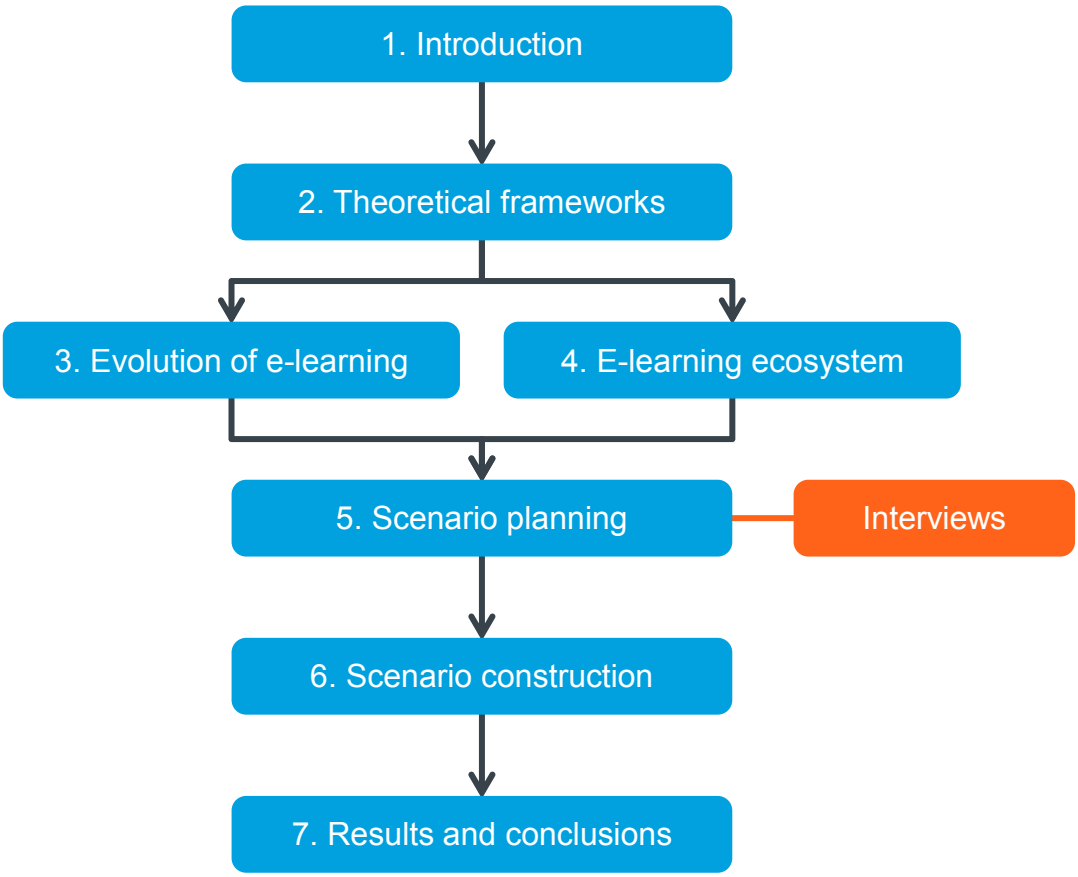

Figure 1: Structure of the thesis

Chapter 2 introduces the theoretical frameworks used in the thesis. The chapter introduces the basis of scenario planning and the PEST framework. The chapter also introduces the qualitative interview methodology used in the expert interviews. Chapter 3 discusses background information of e-learning as well as introduces the history of e-learning leading up to its modern form. The purpose of the chapter is to gain an understanding of the past evolution of e-learning. Chapter 4 introduces the two sides of the e-learning market the corporate buyer and supply-side entities. First, the purpose is to deepen understanding of corporate learning and development motives and drivers specific to e-learning. This is followed by an examination of the current corporate e-learning market.

Chapter 5 presents the key findings of the expert interviews in the form of key trends and uncertainties. In chapter 6, uncertainties are further analyzed and used to construct scenarios for the future of corporate e-learning. The scenarios are constructed, reviewed and further analyzed in this chapter. Lastly, chapter 7 summarizes the key findings and relevant aspects of the thesis work from the perspective of the key stakeholder. The chapter also includes assessment of the results and further research suggestions in light of the thesis.

2 Theoretical frameworks

This chapter introduces the theoretical frameworks and research methods used in the thesis.

2.1 Scenario planning

Scenario planning is an established method for long-term business planning and decision making in situations of uncertainty. Scenario planning aims to capture a range of different future possibilities rather than work as a method for predicting future events (Schoemaker 1995). Modern scenario planning practices originate from military simulations. It was extended to the civil domain by the RAND Corporation after the Second World War. From the late 1960s, scenario planning was adopted by the corporate world. (Van der Heijden 2011)

Scenario planning has been used by Royal Dutch (now known as Shell) since the 1970s as a part of generating and evaluating strategic options. This approach enabled Shell to create better oil forecasts than their competitors, and allowed them to be the first to identify overcapacity in the tanker business (Schoemaker 1995). Recently, the use of scenario planning has extended to the ICT industry, for example, Karlson, Bo et al. (2004) developed future scenarios for the wireless industry from 2003 to 2015.

Modern scenario planning starts by dividing knowledge into two areas, trends and uncertainties. Trends are a classified as knowledge of an industry that "we know we know" or are very certain. Trends aim to gather information about the continuity of the world and map the path forward (Schoemaker 1995). Trends are predetermined elements and they do not rely on a chain of events, but apply in all scenarios (Schwartz 1998). Uncertainties are elements of high importance, but highly uncertain. Uncertainties map the future in various directions as their future outcome is unpredictable. Identifying the interrelationships between uncertainties is an important step to help divide elements into different scenarios. Unlike trends, not all combinations of uncertainties may occur in the future. (Day, Schoemaker et al. 2004)

As stated above, scenario analysis is not a method for forecasting the future, but as Schoemaker (1993) states: "bounding and better understanding future uncertainties." Schoemaker's method was suitable for this thesis, as it gives a way to simplify a substantial amount of data into a limited amount of possible states. Scenarios introduce generically different futures rather than variations of one theme. Each scenario tells a story of how the various elements may interact in certain conditions. In fact, exploring the coherency of trends and uncertainties is an important task, as it will limit the number of possible scenarios by ruling out inconsistent outcomes (Schoemaker 1993). When used successfully, scenario planning can help overcome traditional decision making errors, such as tunnel vision as well as underprediction and overprediction. Scenarios offer new ideas and insights for strategic planning by introducing outcomes that would normally be ignored by decision makers. The portfolio of scenarios allows companies to develop the best strategy to prepare for them all. Later on, the strategy can be adjusted as the path becomes clearer. (Schoemaker 1995)

Generally, the scenario planner has flexibility in terms of how the story of each scenario is built, what ends up in each scenario, and how each scenario's story-line is organized.

To help with the process of creating scenarios, Van der Heijden (2011) introduces the basic principles of what he calls "category clustering", which can be used as guidelines in scenario planning. They are listed below.

- At least two scenarios are needed. More than four scenarios are often impractical.
- Each of the scenarios must be plausible.
- The scenarios must be internally consistent. Events in a scenario must follow unflawed cause and effect relations.
- The scenarios must be relevant to the issues of concern to the stakeholder.
- The scenarios must produce new ideas and insights on the stakeholder's issues.

In this thesis, the ten step scenario construction framework by Day, Schoemaker et al. (2004) was used to construct the scenarios. Below you can find an overview of the steps and what tasks are related to each step of the scenario construction process. The final two steps requiring quantitative modelling were not used in this thesis.

1. Define time, frame, scope and decision variables

   The first step is about defining the issues or decisions that must be addressed by the scenarios. The scope of the scenarios must be broader than the industry that currently defines a company's business. Reviewing past experiences during a similar time frame will help define the degree of expected change.

2. Identify the major stakeholders

   Major stakeholders are parties who have an interest in the issue, both internal and external. This includes parties that are affected by changes and parties that can influence change. Identifying current roles, interest and power positons is a part of this step.

3. Identify and study the main forces that are shaping the future in the scope defined in step one

   The forces that are studied in step three cover political, economic, social and technological factors. The idea is to gather relevant information related to these forces and study how they influence the future. PEST analysis will be used during this step in the thesis.

4. Identify trends or predetermined elements

   The main forces in step three will help identify relevant trends – forces that are certain to unfold in the future. Examining the relationship between trends will help understand the fundamental drivers that affect multiple trends and the future.

5. Identify key uncertainties

   Key uncertainties are forces the outcomes of which are not very predictable. Once defined with the help of the main forces in step three, the most important key uncertainties should be explained, and their interrelationship should be examined.

6. Construct initial scenario themes

   The two most important key uncertainties are used to construct the initial scenarios. To create a full scenario the outcomes of other key uncertainties are

fitted to a scenario. Finally, trends and predetermined elements are added to all scenarios.

7. Assess the internal consistency and plausibility of the scenarios

   Each initial scenario should follow logical cause and effect principles. Outcomes should be ruled out where trends are not mutually consistent, key uncertainties cannot co-exist and stakeholder actions are in conflict with their interests. New, credible scenarios must be created until internal consistency is achieved.

8. Assess revised scenarios in terms of key stakeholder behavior

   Determine how the key stakeholders will react in each scenario. What actions will follow by stakeholders will help strengthen some scenarios.

9. Complete more research with quantitative models
10. Reassess the uncertainty ranges

2.2 PEST analysis

PEST is an acronym for Political, Economic, Social and Technological. PEST analysis is a framework that is used to assess the macro-environmental factors in the process of environmental scanning as a part of a company's strategic management process. In some cases, more components are added to the framework such as Legal and Environmental to form PESTLE.

Tools for environmental scanning were originally introduced by Aguilar (1967) as a process that seeks "information about events and relationships in a company's outside environment, the knowledge of which would assist top management in its task of charting the company's future course of action" (Fahey, King 1977). The environment can be divided into two categories: the operating environment and general environment. The operating environment refers to the companies sector or industry, and all of the entities that the company interacts with, such as customers, suppliers, competitors, regulators, banks, and so forth. The general environment consists of background factors that influence companies in a more indirect manner, such as social, political, governmental, economic, and technological conditions. (Thomas 1974)

As we see, these factors related to the general environment are the same as the ones that PEST analysis considers rather than factors related to the operating environment. As Rue (1973) states, the analysis of the general environment is as least as important as the operating environment.

Environmental scanning and PEST analysis are generally regarded as tools for corporate top management to help define opportunities and threats, typically used together with frameworks, such as SWOT analysis. Thomas (1974) states: "the idea that social, political, regulatory, economic and technological conditions should be taken into account when planning is somewhat in the nature of conventional wisdom". As a result, PEST factors can also be used in analyzing the general environment of a company in context other than corporate strategy. Tovstiga (2013) highlights that producing a list of factors is not the challenge in PEST analysis, but creating a clear understanding of cause and effect relationships of the factors.

The technology behind e-learning is ever changing and evolving. The future of the e-learning ecosystem is not only affected by the technology, but also political, economic

and social forces. Subsequently, PEST analysis is used in this thesis to identify the forces driving change and to help determine the key trends and uncertainties in the expert interviews.

2.3 Interviews

Interviews are regarded as one of the most common methods to gather data in qualitative research. Kvale (1983) defines the qualitative research interview as *"an interview, whose purpose is to gather descriptions of the life-world of the interviewee with respect to interpretation of the meaning of the described phenomena"*. Interviews are conducted by an interviewer that asks questions or creates a conversation with an interviewee. This is commonly performed face to face, but also over the phone or the internet. (King 2004)

Interviews can be divided into three different types: fully-structured, semi-structured and un-structured. Fully-structured interviews are built of specific word-for-word predetermined questions in a pre-set structure, for example, a questionnaire or survey. Semi-structured interviews include pre-determined questions; however, they allow flexibility in the form of adding and removing questions and providing explanations as the interview progresses. Un-structured interviews focus on a general area of interest which allows the conversation between the interviewer and interviewee to develop within the specific area. (Robson 2002)

Qualitative semi-structured and un-structured interview types will work as the basis for collecting data in the thesis. Qualitative interviews seek depth and can be labeled as exploratory. The goal is to understand why and how the interviewee comes to have their particular perspective in the research topic. All qualitative interviews have common characteristics such as a low degree of structure, use of open questions and a focus on the specific situations and events in the world of the interviewee. Opposing and unwanted characteristics include general opinions and abstractions. (King 2004)

(King 2004) emphasizes the importance of the relationship between interviewer and interviewee in qualitative research interviews. In fully-structured quantitative methods the interviewees are seen as passive subjects that only contribute to delivering data through pre-determined questions. However, qualitative research interviews regard the relationship between interviewer and interviewee as part of the research process. The interviewee is seen as an active and influential participant of the conducted research and not a passive respondent.

Qualitative research interviews are flexible in nature. The interviews can be informal, allowing the interviewer to gather rich content, find underlying motives on the research topic. Other advantages are that qualitative interviews can be adapted to different subjects, focused or very broad. Flexibility and adaptability allow qualitative interviews to examine the complexity and meaning of a subject rather than just gather quantitative data. (King 2004) One of the disadvantages of the qualitative research interview is that they are time consuming. This directly affects the ability to gather a large sample size which means that biases cannot be ruled out. There are concerns of reliability in qualitative research interviews as they lack standardization. The expertise of the interviewer is crucial in dealing with these disadvantages. (Robson 2002)

3 Evolution of e-learning

This chapter is the first part of the literature review of the thesis. In order to understand the underlying foundations of e-learning and the goals of learning technologies, we must first define key terminology. The purpose of this chapter is to broaden the perspective on educational technology and e-learning. The chapter introduces a brief overview of historical developments of learning technology. The purpose is to recognize the underlying environmental factors behind the evolution of learning technologies leading up to modern e-learning.

3.1 Terminology

This section briefly introduces key terminology used in this thesis, specifically, terminology applied to the entirety of educational technology and e-learning.

3.1.1 Educational technology

E-learning can be regarded as a modern approach to the entirety of educational technology. Ellington (1993) defines two distinct perceptions of educational technology: technology *in* education and training and technology *of* education and training. Technology *in* education and training is more focused on the technology providing the educational information. In the case of e-learning, this would relate to aspects such as hardware and software.

Technology *of* education and training considers all aspects of the design of teaching and learning. It is a broader field, containing technology as well as learning processes (Ellington 1993). Similarly, Roblyer and Doering (2013) define educational technology as a combination of tools and processes that are used to address educational needs and problems. Overall, the goal of educational technology is to improve the efficiency of the learning and teaching process. Ellington (1993) lists the incentives that can be behind the use of educational technology:

a. increasing the quality of learning, or degree of mastery
b. decreasing the time taken for learners to attain desired goals
c. increasing the efficiency of teachers, without affecting quality
d. reducing costs, without affecting quality
e. increasing the independence of learners, and the flexibility of education and training provision

This thesis will focus more on the technological aspects of e-learning, reflecting to the perspective of technology *in* education and training.

3.1.2 E-learning

E-learning refers to the use of computer network technology, primarily the Internet or intranets for the delivery of information and instruction to individuals (Welsh, Wanberg et al. 2003). From a business perspective e-learning is, as Rosenberg (2001) states: “the use of Internet technologies to deliver a broad array of solutions that enhance knowledge and performance.” E-learning can be characterized as a computer-based system that people can use to communicate, write, teach, learn and collaborate with each other (Andrews, Haythornthwaite 2007). Furthermore, e-learning can be viewed

differently by learners. To some, e-learning can comprise an entire online learning environment or system, while to other learners e-learning may only refer to online course material or online social networking.

E-learning covers a wide range of applications and processes. Many organizations and individuals use e-learning as a general term when referring to computer-based learning (CBL), web-based learning (WBL), and distributed learning. Some may also include knowledge management and virtual collaboration in the definition of e-learning (Welsh, Wanberg et al. 2003).

Rosenberg (2001) introduces three fundamental criteria of e-learning. First, e-learning is networked. This capability allows e-learning to be capable of instant updating, storage, retrieval distribution and sharing or information. This criterion is becoming a requirement for all e-learning. Second, e-learning is delivered to a computer via standardized Internet technologies. The definition of a computer is changing constantly by the rise of smartphones and other technologies. The criteria of delivering e-learning via a standardized protocol and application, such as TCP/IP and a web browser, respectively, is all to do with the idea that e-learning solutions are delivered over a universal platform.

Third, e-learning focuses on the broadest view of learning. E-learning is not limited to the delivery of instruction by traditional training practices. E-learning includes delivery of information and tools that improve performance. This is why, for example, web-based training is not synonymous with e-learning. Web-based training only describes the method of the delivery of information. Furthermore, distance learning is not synonymous with e-learning, as it can be conducted over methods, such as written correspondence. Overall, e-learning is regarded as a certain form of distance learning, making use of the latest available technologies and learning approaches to deliver learning by various contexts. This thesis approaches e-learning from its most extensive technological definition.

3.2 Combining technology and learning

Technological advances have always had the power to alter society. These disruptive technologies may replace or co-exist with previous technologies. Simply, e-learning would not be possible without the emergence of key technologies - film, television, computers and the Internet (Koh, Lim 2008). As technology has had the capability to alter society, it has also had the potential to alter education. However, when technology is used in learning, there are important factors to consider. Simply implementing technology in learning contexts does not improve the effectiveness of learning. Certain principles must be used to give purpose for the use of a specific technology in the context of learning. The understanding of the human learning process, when merged with appropriate technologies, allows advantageous learning technologies to emerge.

The objective of learning theories is to describe and understand how the complex process of learning occurs in people. Overall, without theories of learning, implementing technology to enhance learning would not offer much benefit (Alzaghoul 2012). Modern learning theories describe that learning comes as an individual process, consequence of the learner's experience and interaction with the world. Learners are no longer viewed as empty vessels, waiting for the teacher to pass on knowledge. Instead, in modern learning theories, the learner's whole sociocultural setting is taken into

consideration. Learning is experienced as an individual process, but it is also a consequence of the interaction with members of the same community, where both explicit and tacit knowledge is preserved and generated. Different types of communities and cultures generate and transfer knowledge in various ways, both informally and formally. (Driscoll 2002, Andrews, Haythornthwaite 2007)

Developments in theories of learning and pedagogical practices work as an important foundation, as their goal is to help understand the processes human learning. In return, this helps build effective educational systems and technologies. Studies by Leidner and Jarvenpaa (1995) and Piccoli, Ahmad et al. (2001) provide support for improved learning outcomes when learning theories were incorporated in to design and application of e-learning. Instructional strategies are preferably built on a combination of learning theories. The critical question here is not "Which is the best theory?", but as Ertmer and Newby (1993) state, "Which theory is the most effective in fostering mastery of specific tasks by specific learners?" Overall, it is the instructional strategy that dictates if training is effective and if it produces results, but it also determines the requirements of the underlying technology, which is used to implement and facilitate the strategy. From past to future, as the understanding of human learning has evolved, learning technology has followed close by.

Andrews (2011) asks the question that does e-learning require a new theory of learning, as existing theories do not account fully for what happens in e-learning. In many cases, technological advances and learning are seen as co-evolutionary. As one of them changes, so does the other. Technology changes the way people behave, interact, access information and use information. These reflect to social behavior, and in the long run, influence the patterns by which people learn. Some argue that learning theories and pedagogical practices catch up with technology, while some argue that it is the other way around (Bates 2015). Although this thesis focusses on the technological aspects of e-learning, it is clear that the future of e-learning will be influenced by advancements in technology and in human learning.

3.3 Advances in technology

E-learning is a field specifically linked to learning through the use of technologies. Over time, new technologies have emerged and been adopted for the use of learning. To understand the underlying factors contributing to industry change, this section provides an overview of events associated with the development of modern e-learning.

3.3.1 Pre-microprocessor era

The early roots of e-learning originate from the 1950s, two decades before the time of the microprocessor that would later give rise to the personal computer. The U.S. military had grown interest in automating teaching and they were known for using motion pictures to train their troops during the 1940s. (Koh, Lim 2008) However, while film and TV were considered an educational revolution, they never replaced teachers. This was because they did not provide teaching-essential qualities, such as feedback, interaction and the ability to adapt to learner needs (Rosenberg 2001).

As technology evolved, it was found that there could be numerous possibilities for automating the teaching process with computers. Most importantly, the shortcomings of film and TV, particularly interactivity, could be addressed with computers. This gave

rise to training delivered by means of a computer, generally referred to as computer-based training (CBT) or computer-assisted instruction (CAI). In essence, these systems offered self-paced possibilities with rapid feedback, replacing the teacher with programmed materials that could offer individualized instruction to learners. The learner could take an active role in the learning process and they were able to master a subject through the behavioristic drill and practice approach. Computers were large mainframes and minicomputers that were operated through terminals. Time-shared computer systems allowed multiple people to access the computer mainframe, as resources were provided to as many terminals as possible. (Molnar 1997)

Changes in the political climate that followed the Soviet Union's Sputnik I satellite launch in 1957 gave the research of computers in education a significant increase in funding (Van Meer 2003). A major large-scale research project for the use of computers in education, and notably one of the first e-learning-type platforms, was the Programmed Logic for Automatic Teaching Operations (PLATO) system that was established at the University of Illinois in 1959. The combined system of hardware and software offered thousands of hours of instructional material and it could accommodate graphics, animations, simulations and text-based instruction. It even offered students a way to communicate with their peers and teachers over the PLATO network. Rather than focusing on delivering content by the methodology of drill-and-practice, PLATO divided course materials in to interrelated conceptual packages. Students could progress quickly through familiar material and students not familiar with a subject were re-directed to the appropriate material until it was mastered. (Molnar 1997, Van Meer 2003)

The United States Department of Defense started to research how to connect computers to one another, creating the Defense Advanced Research Projects Agency (DARPA) in the early 1960s. This project would later lead to the development of the TCP/IP protocol suite that is the basis for data communication worldwide over the Internet and equally important for the emergence of e-learning. (Schneider, Evans et al. 2009)

From the 1950s to the 1970s, educational institutions were under financial pressure in the United States, as enrollments increased and costs grew exponentially (Van Meer 2003). The increasing capabilities of computers and the decreased costs made CBT and CAI technology feasible (Sleight 1993). A distinct trend during this time was the collaboration of universities and mainframe computer companies to further the development of CBT and CAI systems to help meet the rising demand of educational productivity (Alpert, Bitzer 1970). The computer industry was a closed ecosystem at the time. The ecosystem was managed by mainframe computer companies, as they were the entities that provided both hardware and software, although some software development efforts were conducted by universities.

Nevertheless, Roblyer and Doering (2013) find that the problem with CAI and CBT systems was that they were extremely complex to manage and expensive. Reiser (2001) argues that research efforts up till the end of the 1970s had very small impact on education, even though one could argue that it did allow educators to learn about the role technology could play in education.

3.3.2 Post-microprocessor era

The emergence of microcomputers in the mid-1970s transformed the ecosystem around educational technology. The relatively low-cost microcomputer favored desktop use

because of its small size and microcomputers were able to perform the same functions as their larger predecessors. The personal computer (PC) revolution had started at the early 1980s and microcomputers had spread to offices, schools, libraries and homes. In part, the focus shifted from hardware to software. (Molnar 1997)

The forecasted implications of personal computers were substantial. Teachers could access computers more freely allowing them to have more control over software. Teacher-specific software, author languages and systems were created, however because of the time consuming nature of creating instructional material, teachers' interests faded (Roblyer, Doering 2013). The general increase in the number of computers in the market boosted demand for educational software. This kick started the educational software industry. Furthermore, the development of text editing software and spreadsheet software enabled the use of computers as tools to create educational content without the need for programming skills. This had a large impact on how educational material could be represented and manipulated. (Koh, Lim 2008)

Personal computers did not have an immediate impact on education. During this era, advances were being made on how people learn. The rise of cognitive theory was changing the field of instructional design. Often efforts on what would work to according to the latest understanding was limited by computer capabilities of the time, mainly leading to programs being text-based learning solutions offering behavioristic drill-and-practice solutions (Rosenberg 2001). Educational institutions used computers primarily with the drill and practice approach and to teach computer skills, such as word processing (Reiser 2001). The use of computers in education was far from innovative.

The seventies and eighties was a time period during which a substantial effort was put into the field of computer-based training. In addition to the rising software industry, the creation of instructional material was commercialized. However, many efforts became obsolete quickly as differences in hardware, software, programming languages as well as other technical barriers hampered development. Programs were developed in different formats increasing development costs. Rapid changes, such as the shift between floppy disk standards and the incompatibility between operating systems created problems for developers. The rather slow development cycles of content meant that the knowledge base on which a program was built on was obsolete when the program was released. Content stability, specifically how long of a period the content is valid, was short which created uncertainty and investments in CBT were hindered. As content was stored and distributed by methods, such as CD-ROM, changing or updating content after release was merely impossible, further shortening content stability. In addition, the lack of authoring and development standards played its own role in the failure of the promising CBT industry (Rosenberg 2001).

To conclude, the educational technology industry entered the 1990s with multiple factors hindering its development. The variety of different platforms across the market made it impossible to create solutions for all platforms. The limitations of software and hardware and lack of awareness of the latest instructional design techniques and learning theories resulted in boring and unauthentic learning solutions. Uncertainty in content stability, high development costs and long development times reduced funding and attempts to deploy an effective CBT system.

3.3.3 The Internet era

Through the 1980s up to the late 1990s, CD-ROMs were on of the first choice of medium for delivery of training. CDs were inexpensive and corporations quickly started to acquire CD mediated materials for their training needs. However, CD-mediated courses were not living up to the hype, and dropout rates were substantial. Many people were not interested in learning alone, as there was no one to turn to for help and support. (Lee 2010)

In 1989, Tim Berners-Lee introduced a new collaborative tool at the European Organization for Nuclear Research (CERN). This system was based on hypertext and it was used to access a shared database of nodes. This system was made available to the public later, in 1992, under the name World Wide Web (WWW). Further developments followed as some of the first web browsers hit the market, such as Mosaic in 1993. Web browsers allowed people to access the Internet through a visual user interface, also allowing users to view more engaging content and media, rather than just text. (Lee 2010)

Personal computers and Internet access made it possible to learn and develop skills in online environments. It was in fact the 1990s when the term e-learning first emerged. The term e-learning was first used by a company named CBT Systems to primarily refer to computer-based training that was delivered over a network, such as a corporation's intranet or the Internet (Hubbard 2013). E-learning was seen as the latest addition to educational technology. Since the mid-90s, businesses, industry and military have viewed the Internet as a possibility to provide information and instruction to a wide reach of learners at a relatively low cost. Accessibility to a computer made it possible for a learner to access information and get performance support on-demand (Reiser 2001). The social implications and possibilities of the Internet were quickly understood. People could access and communicate with other people through computer-mediated communication (CMC) by methods, such as email, chat rooms, forums, video conferencing and other digitalized forms of communication (Koh, Lim 2008).

As the World Wide Web evolved and computational power and capabilities improved, WWW started to offer more possibilities, more choice and more interactive content. Books, documents and audiovisual material were uploaded to the Web to create vast libraries of content and search engines emerged to help users to easily find information (Berge, Muilenburg 2013). The World Wide Web provided the ability to take advantage of new approaches to learning. On-demand training allowed for a more leaner-centric approach to be used in learning.

E-learning took a large leap in investments and interest during the 1990s, as corporations rushed to implement their own e-learning. Soon after, it was understood that e-learning wasn't the silver bullet to all learning needs after all. Many corporate e-learning initiatives failed due to the lack of familiarity and miscalculations in resource requirements. The growth rate of e-learning used in corporate training dropped from 1997 to 2000. The rush to implement e-learning underlined the technology side and emphasis on learning itself was forgotten. Like any technology, success is determined by whether users are willing to adopt it. (Tai 2007)

Developing human skills with e-learning was more complex than what it seemed at first. Every time a new technology introduces itself, many of the limitations are overlooked. There was no e-learning solution that fit all learners. The challenge that modern corporations face is to blend different approaches and technologies that are best

suited for learner needs and objectives (Tai 2007). Historical developments should be considered in the new age of e-learning technologies to avoid the recurrence of events that resulted in past failures. The historical review highlights that merely implementing technology in learning does not introduce benefits as is, but there must be unique benefits that the technology offers in the context of learning.

3.4 Benefits of modern e-learning

Today, corporations have overcome the main issues of early e-learning. Corporations use e-learning to tackle challenges that they face in the business environment and to address certain fallbacks of traditional classroom training. Rosenberg (2001), Zhang and Nunamaker (2003) as well as Urdan and Weggen (2000) list some of the benefits driving the adoption of e-learning in corporations:

Cost and time saving. E-learning is, in many situations, a cost effective way to train people, as it saves travel expenses, training time and reduces the need for a classroom delivery infrastructure. Learners are away from their actual work for a shorter period of time. E-learning is also scalable, as the same content can be used to train 10 or 1000 people, without incremental costs, as long as the appropriate infrastructure is in place. Corporations can also leverage their intranet infrastructure investments by utilizing it for e-learning.

Availability and responsiveness. Self-paced e-learning is available 24/7. It is on-demand, just-in-time, any time and accessible from any location. E-learning can reach a vast number of learners simultaneously in cases when fast changes in business practices require that people are trained at a fast pace.

Timely. E-learning can be updated instantaneously. Changes to content can be distributed easily and quickly, so that content is useful for longer periods of time and the content is up-to-date and more accurate.

Customized. The same e-learning content can be delivered to all learners, yet e-learning can also be customized for different styles of learning and different learner needs to provide just-for-me learning. This typically results in higher retention of content.

Universal. E-learning takes advantage of universal internet protocols and web browsers. Generally, people can access e-learning the same way from any device. Differences between platforms and operating systems are not an issue. As e-learning can be accessed through universal and familiar web technologies, users do not need a ramp-up time, they can access it with basic computer skills.

Collaboration and community. Web technologies enable trainers and learners to communicate, learn and share knowledge among each other even if they are physically separated. This can lead to more motivation and encouragement for organizational learning.

But why are corporations using e-learning instead of classroom training? Corporations will always have the need to train their employees. However, many of these trainings take place off-site in classrooms. Classroom-based training is subject to various defects. Having the participants in a classroom away from their work may result in productivity losses. Corporations may face difficulties in arranging a classroom training assets.

Furthermore, the corporation may find it hard to measure the impact of the training towards corporation's success. Traditionally, training has been supply oriented, the schedule is seldom decided by the learner's themselves. Content is also rarely customized for each learner, as in a classroom setting you cannot target the needs of an individual learner. (Faherty 2003)

Overall, modern e-learning approaches contribute various benefits for corporations when used in the correct context. E-learning can be used to achieve a corporation's strategic goals and to create a competitive advantage (Rosenberg 2001). Tai (2007) lists that e-learning is usually implemented because of the following: strategic reasons, accessibility, speed, geography, attraction, retention, productivity or investment purposes. All in all, the end result of a successful e-learning initiative can, according to Cross (2004): accelerate business processes, support mergers, improve productivity, help customers, further supplier and partner relationships, accelerate employee orientation, align workforce with strategic goals, help launch new products and services on a global scale, roll out new enterprise systems and document regulatory compliances.

4 E-learning ecosystem

This chapter is the second part of the literature review of this thesis. This chapter presents current corporate learning and development practices and the corporate e-learning market in general. The purpose is to establish an overview of supply and demand by examining the e-learning ecosystem from a broad perspective.

Section 4.1 introduces corporate learning and development and establishes the basis for the current practices and interests of corporate L&D. Section 4.2 introduces the e-learning market's demand and supply drivers. Section 4.3 examines the state of the global corporate e-learning industry and introduces current market characteristics. Finally, section 4.3 introduces supply in the e-learning market by reviewing different e-learning suppliers and related technologies.

4.1 Corporate learning and development today

Within the context of corporations, learning is a process in which people acquire new skills and knowledge for the purpose of enhancing their performance. The main objective of the learning process is to enhance the performance of the workforce. The main incentive for enhancing workforce performance is to add value. This can be a result of better products or services, lower costs, increased competitive position, greater capabilities for innovation, improved productivity and increased market share. In any case, learning enables individuals or groups of individuals to perform faster, better or smarter, so that the corporation as a business benefits. (Rosenberg 2001)

4.1.1 Training programs

Corporations carry out a range of training programs, which aim to train a variety of skills to employees. Training is used to support learners on acquiring skills and knowledge, but also on utilizing new knowledge for a specific task (Rosenberg 2001). Corporations' learning departments responsible for training need to provide value and have a concrete impact on business performance. There are several key elements that are considered when implementing training programs. First, clear learning goals and objectives are determined. Based on the target group of the training, a suitable approach to learning for the specific audience and topic is selected. This can include such things as, lectures, self-study material, simulations and more. The training can utilize a variety of technologies and a combination of approaches. Training is monitored or measured to determine how effective it is. This creates challenges for certain approaches to training that rely on informal learning, as informal learning is more difficult to measure. Furthermore, in high accountability situations, there must be the capability for an assessment or certification. (Rosenberg 2001) These elements summarize the requirements for implementing successful learning and development (also referred to as training and development) programs.

Bruck (2015) divides corporate learning into three distinct categories, compliance training, professional development and capability acquisition. New hires must be introduced to the corporation's industry regulatory compliances through (typically mandatory) formal compliance training courses. Training is mainly formal, because employee compliance must be assessed. Professional development aims to provide formal and informal opportunities to develop professional proficiencies, such as self-

paced learning though videos, communities of practice or formal courses. Finally, capability acquisition is concerned with training employees in business-specific skills, typically by the use of formal or informal activities. These can be the practice of new skills in an environment where the learner can learn from other learners. An important aspect of corporate learning and development is that it is continuous. Formal and informal learning are not mutually exclusive, quite the contrary. Formal training is typically used to form a basic understanding of the topic and informal learning methods are used to reinforce learning over time (Bruck 2015). This creates a vast variety of demand for different types of both formal and informal learning products and services in corporations, as a single tool or approach may not fit the variety of training programs.

4.1.2 Approaches to learning

There are three main approaches to formal learning that corporations use: face to face, blended and self-paced online learning. Face to face has generally been the primary long-running training methodology in the industry. Face to face is also referred to as classroom, instructor-led or synchronous training. Modern tools and communication technologies have enabled the delivery of virtual instructor-led training (virtual ILT), also referred to as synchronous e-learning.

The City & Guilds Kineo and e.learning age (2014) report states that blended learning is the best working practice for corporations. In blended learning, corporations use e-learning together with classroom training to capitalize the strengths of e-learning and still maintain the benefits of a classroom setting. Blended learning is a mix of self-paced (asynchronous learning) and instructor-led (synchronous learning) elements. At its simplest, it can be instructor-led training (traditional or virtual) combined with pre-training or post-training self-study e-learning. Blended learning is driven by the need for more kinds of training, to more employees, in more places within existing training and development budgets. Blended learning allows training to introduce a mix of learning methods, so that the learning needs and methods of different participants are better considered (Woodall 2012). Self-paced learning can be developed in advance and made available for the learner at any time or place, and learners do not have to attend the training at the same time. In contrast, synchronous learning, whether it is face to face or virtual classroom training, happens in real time and it requires all learners to attend training at the same time.

Figure 4.1 displays that corporate formal learning methodologies still mainly rely on face to face training, which makes up 55% of training according to Towards Maturity (2015). Although recognized as beneficial, blended approaches are used only in 26% of training programs. Online self-study is used in 19% of training deliveries. The majority of respondents predict that there will be a shift to blended and online solutions in the next few years. Although, it is worthwhile mentioning that previous predictions in an increase of blended and online learning from 2012 to 2015 did not realize in the predicted time frame. (Towards Maturity 2015)

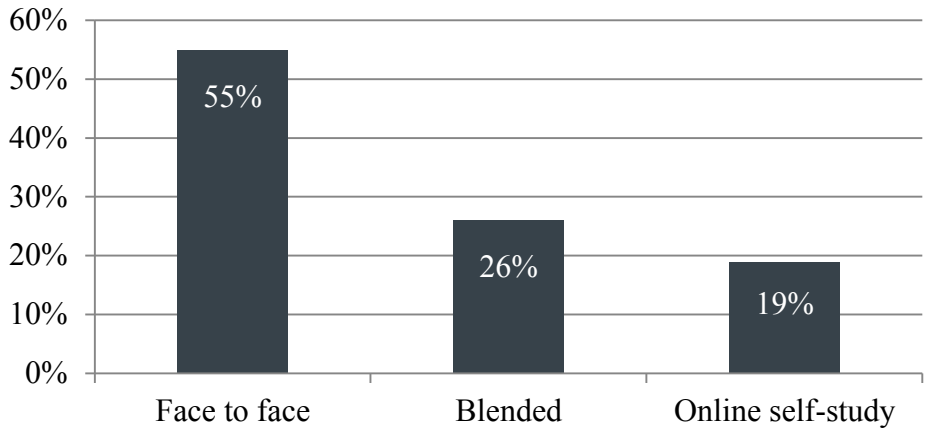

Figure 4.1: Distribution of formal learning methodologies used by corporations (Towards Maturity 2015)

There is an on-going shift occurring in corporate training. There are indications that corporations have started to look into new models of learning; one such model is the controversial 70:20:10 framework. This framework suggests reduced amounts of formal training (10%) in exchange to learning through social interaction (20%) and learning through informal, on the job experiences (70%). The framework's main idea is not to accurately define what training methodologies should be used. The purpose is to describe a context for where learning occurs and underline that learning should happen at the point of need, in the work flow. This type of learning is also called applied learning. Furthermore, informal learning, including social learning is incorporated as a part of the blend rather than a separate channel for learning. (Towards Maturity 2015, City & Guilds Kineo, e.learning age 2014)

The real world application of new learning models, such as the 70:20:10 framework can already be seen in corporations. Figure 4.2 shows the shift in learning strategies in U.S. based corporations from 2009 to 2015. Here, we can see that the volume of formal instructor-led training (ILT) is decreasing (although the importance of formal ILT is growing according to the report). Virtual ILT and online self-study are both increasing in volume from 2009 to 2015. In addition, we are seeing informal learning, such as on the job and collaborative learning increasing in real-world corporate use.

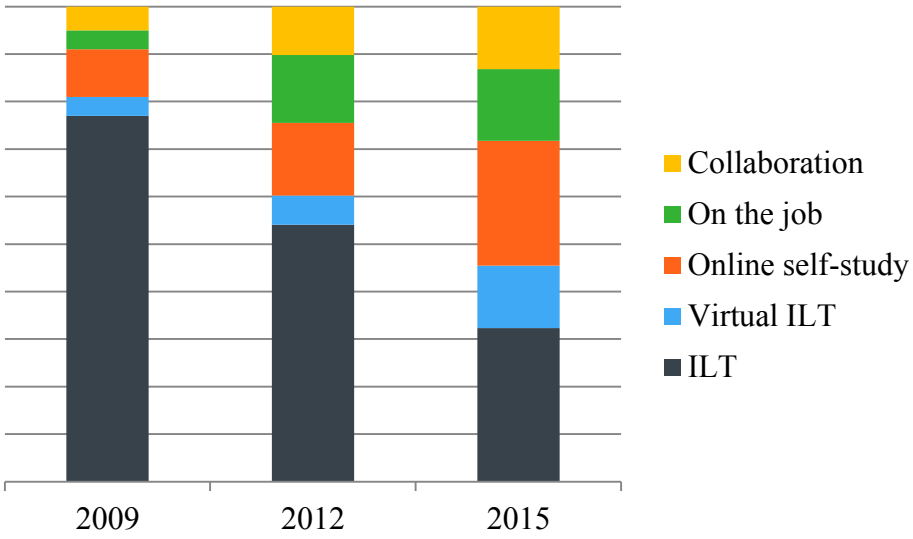

Figure 4.2: Distribution of corporate learning strategies in studied corporations (Carroll, Singaraju et al. 2015)

To conclude, formal learning approaches are shifting to incorporate more blended approaches, driving demand for e-learning. Corporate learning is also experiencing a shift to include larger volumes of informal learning, such as on the job, collaborative and social learning in their learning strategies. Whether corporations use online, blended or classroom approaches, learning management is implemented through a learning management system (LMS), a key part of a corporation's effective professional development infrastructure (Docebo 2014).

4.1.3 Corporate learning management

Corporations use a vast variety of content, services and technologies to develop, deliver and manage learning. Learning management systems (LMS) are software systems (usually referred to as platforms) that manage the entire learning process and associated content. The LMS is typically used to deliver the corporation's curriculum to learners. The LMS works as the infrastructure that, at its simplest, manages course registrations and delivers learning content. Typically in corporate context, e-learning content is distributed via the LMS. (Davis, Little et al. 2004)

LMSs can also be referred to as virtual learning environments (VLEs), the general category that refers to platforms that provide a wide range of functionalities for trainers and learners. Depending on the system's features it can be referred to with different abbreviations. There are content management systems (CMSs), more focused on features related to storing and distributing content. Learning content management systems (LCMSs) on the other hand focus on development, management and publishing of content. In this thesis, LMS is used as a ubiquitous term to refer to all of these platforms.

As stated, a learning management system can handle a number of tasks, such as administration, procurement, content management and content authoring. Libraries and digital resources are linked to the LMS to offer supplementary databases of materials necessary for learners. Users access the LMS via a user portal, typically by using a web browser. Modern learning management systems have become more feature-rich,

enabling them to identify and assess individuals, track learner progress, supervise the learning process as a whole and provide analytics. In addition, LMSs can handle skill gap analysis, tracking and reporting as well as communication between learners. Value added services can be linked to LMS to provide further functionalities, such as helpdesk or advising services. (Watson, Watson 2007)

LMSs can also work as a link to the human resource functions of a corporation by implementing regulatory compliance, competency, performance, human capital and talent management functionalities (Watson, Watson 2007). Providing analytics on effectiveness of training is also a crucial feature that is desired by corporations to help in decision making.

There are a multitude of standards that support interoperability of e-learning content and applications within LMSs, such as SCORM, Tin Can/Experience API, IMS-LTI and others. Most LMSs support at least one of the aforementioned standards (McIntosh 2015). Overall, an LMS is a key piece of technology that supports a corporation's learning and performance improvement capabilities. Although systems vary and include features that are built for specific purposes, all LMSs share a similar set of features described above. As these platforms are central to corporate e-learning, the market and developments surrounding these platforms and their suppliers have the potential to influence the future of e-learning in corporations.

4.1.4 E-enabled skills

Corporations come in all shapes and sizes, all with individual requirements for learning. E-learning is regarded as a suitable training method for certain skills. Consequently, corporations have a clear tendency as to which skills are trained by e-learning and which are not.

For many corporations, one of the largest requirements for training is made up of compliance training, the mandatory training to educate employees on laws, regulations and policies that affect their day-to-day jobs. Consequently, the most likely training offered as e-learning is mandatory compliance training. E-learning is used more than twice as often for mandatory compliance training courses than for non-mandatory courses. This also reflects on the fact that e-learning is used more in process-driven skills training, such as introducing new business systems and processes, health and safety and technical IT skills and less for soft skills training, such as leadership, communication, problem solving and team building. (Towards Maturity 2015)

(Towards Maturity 2015) reports that in 2011, e-learning was used in 42% of process driven skills and 32% of soft skills trainings. Most recently in 2015, the use of e-learning has increased to 59% and 43% of training for process driven skills and soft skills, respectively. Figure 4.3 below illustrates the top 11 skills offered by corporations. As figure 4.3 illustrates, IT, health & safety and industry-specific (e.g. compliance) training are the most probable to utilize e-learning. Team working, project management and customer service related trainings utilize e-learning in fewer than 45% of cases, which is why the data is not illustrated in figure 4.3.

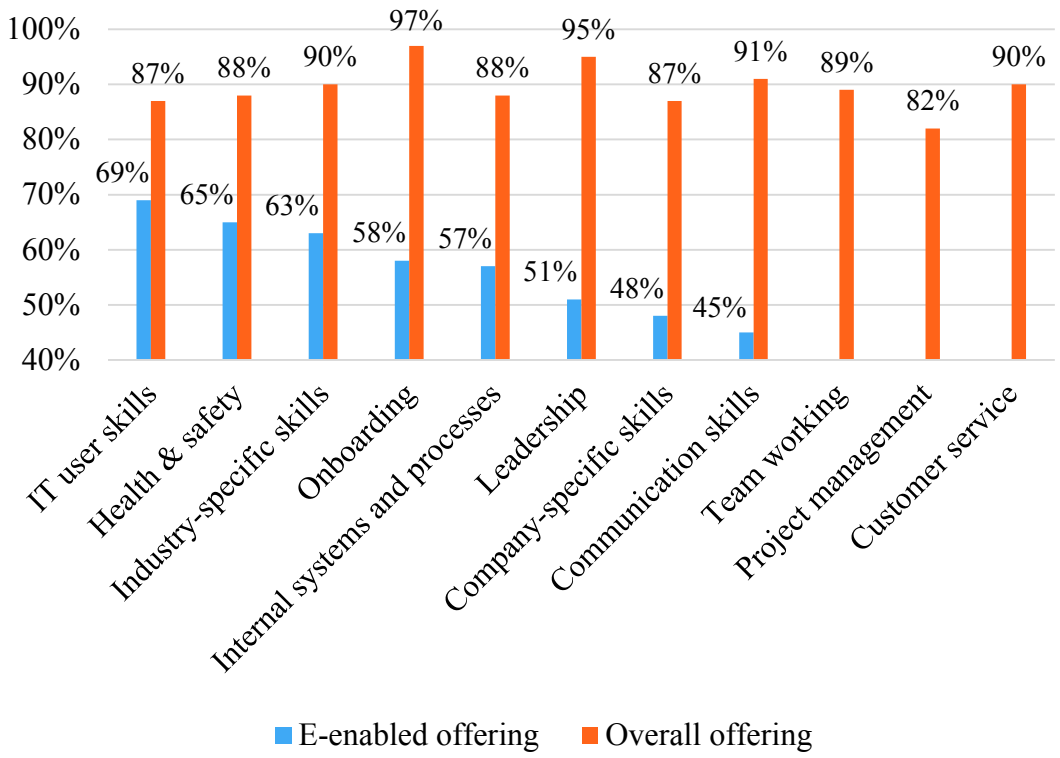

Figure 4.3: Top skills offered in corporations compared to top skills offered via e-learning (Towards Maturity 2015)

E-learning is not suited for training of all types of skills, and face to face training will always have its exclusive benefits and uses in corporate training. Although the amount of soft skill e-learning training is increasing, Scott-Jackson et al. (2015) find that the largest barrier to using e-learning (or generally digital learning resources) is that is does not suit certain learning styles. This can include, for example, delivering soft skills (such as leadership training) that rely on a large amount of human interaction solely by e-learning. These factors promote the use of blended learning approaches.

Today, factors that apply to the implementation of training, such as technology skills and infrastructure are less of an issue than they were previously. More focus is on training itself, as intangible factors in training, such as suitability for different learners is driving to the core of issues (Scott-Jackson, Owens et al. 2015). It is important to comprehend that there are also additional factors that need to be considered when choosing a training approach for a certain skill. As a basis, interactive and engaging e-learning content requires longer development times and has larger up-front costs than traditional face to face training. However, specifically asynchronous (self-study) e-learning can offer high economies of scale in the long run, as training can be distributed to a large audience, driving down unit costs of training (Sharma 2011). This is also one driver behind the implementation e-learning onboarding and compliance trainings. Overall, the increased use of e-learning in both process-driven skills and soft skills reflects how corporations are moving to blended and online learning approaches for business critical skills (Towards Maturity 2015).

4.2 E-learning market drivers

This section reviews e-learning market supply and demand-side drivers.

4.2.1 Corporate demand drivers

The corporate landscape of mergers and acquisitions, globalization, short product life cycles, hyper-competition, regulatory aspects, instantaneous communications and the rapid shift to the information age is changing how people work and learn (Rosenberg 2001). Falling behind the speed of change can result in a corporation losing their competitive advantage in the market.

In many countries the economy has shifted from a product-based market to service-based market, giving rise to a knowledge-based economy. Learning has become mission critical to many corporations. Human or intellectual capital provides one of the main sources of economic value. Employees need to constantly improve their skills. This is achieved through professional development, as the majority of the workforce does not have time and resources to attend school periodically. Furthermore, formal education typically supplies general skills for a profession. Many work-specific skills must be learned later on, on the job or through training and development programs. The result is the need for lifelong learning, a term coined for the continual professional development of the workforce. Continuous lifelong learning has become a strategic imperative to corporations. Furthermore, corporations that implement lifelong learning have been coined learning organizations. (Urdan, Weggen 2000, Roland Berger 2014)

A democratic shift is taking place. Older generations retire and Millennials increase their presence in the workforce. Millennials are regarded as “digital natives”, more technology-oriented and accustomed than preceding generations. Generally, more open to technology trends. This generation is accustomed to online education tools. (Roland Berger 2014)

Skill gaps in the workforce result in an increase of competition for skilled labor. Today, 50% of jobs require technology skills and it is estimated to increase to 77% in the next decade (IBIS Capital 2013a). Learning organizations are differentiating themselves from others by providing lifelong learning. The rapidly changing business environment creates new requirements regarding business strategies. Strategies must maximize the synergies between lifelong learning and workforce productivity (Urdan, Weggen 2000, Roland Berger 2014). In addition, lifelong learning helps employees acquire knowledge and progress up the corporate ladder. This drives higher employee retention which is a growing in concern as corporations compete for talent (Docebo 2014).

Life of knowledge and life of work-related skills are getting shorter. Both employees and customers have to adapt to fast technological changes, increased complexity and novel business models. There is an ever-rapid need to reskill employees and teams. However, as changes are occurring faster, this is leading to employees needing to reskill themselves. Around 90% of the fastest growing jobs in the U.S. require some degree of mastery of critical knowledge, skills or abilities in technology (IBIS Capital 2013a). Short-term strategies are being implemented more often due to the changing competitive landscape, creating the need for agile corporations in which the workforce can quickly adapt to changes. This is also reflecting directly to the requirements of employee training. (Roland Berger 2014)

Globalization has given birth to huge corporations spanning various cultures, languages and time zones, resulting in a workforce with various educational levels and needs. The larger the corporation's geographical spread, the more important it is that corporate learning reaches all of these locations. Corporate standards must be ensured and trained to the entire workforce to ensure that there are no redundancies in operations. (Urdan, Weggen 2000, Roland Berger 2014)

Increasing competition and increasing cost pressures are resulting in the need to implement more effective and efficient operations. Many corporations have survived the 2008 financial crisis by cutting internal costs. Tight competition is still driving corporations to constantly review their costs. Many businesses are driving down costs by cutting their corporate training budgets or demanding learning departments to add value with either the same or smaller budgets. Generally, the trends are driving the need for training that can be created with lower costs and can be trained in a faster time, overall reducing the amount of time employees are away from their work. Rather than working with smaller budgets in the future, the key challenge for learning departments is to provide value and have a concrete impact on business performance. (Roland Berger 2014)

4.2.2 Market supply drivers

As the distribution of e-learning relies on networks and the Internet, the supply-side of e-learning is driven by web and computer technologies. In addition, standardization and e-learning policies have consequences on the e-learning market.

Technology

Technological advancements have made e-learning more accessible. Internet access is becoming a general utility globally. People are able to access the Internet at home, at work and even while on the move. Internet penetration is already high in developed countries and developing countries are catching up. The global number of Internet users is over 3.2 billion and it is still rapidly growing as mobile networks spread reach into rural areas in developing countries, overall allowing for a rapid increase of potential mobile users (Internet Live Stats 2015). The estimated number of smartphone users is expected to triple from 2013 to 2019 to over 5.5 billion. The declining costs of technology and rise of mobile technologies have started to create new possibilities for how e-learning can be supplied to anywhere at any time. The potential for mobile learning, or m-learning, is one to consider as the mobile device user base grows and the number of PCs falls. (Roland Berger 2014)

Global average internet connection speeds are experiencing small steady growth regionally. In Q4 2014, the average global Internet connection speed was 4.5 Mbps, in Q2 2015 it had grown to 5.1 Mbps (Akamai 2015). Overall, connection bandwidth, computing power and storage capacity advances are also enabling people to create and rich interactive content that can efficiently be delivered over the Internet.

Policies

With the rise of e-learning, policymakers are also recognizing the potential and promoting new e-learning initiatives. In many countries, policies are the major contributor which influences the adoption of learning technology, not technology

adoption in itself. Policies mandating the rollout of the technological infrastructure and funding play a crucial role (Ambient Insight 2016).

The EU has supported the "Open Education Europa" initiative since 2013, which aims to bundle and offer online education from various providers (Roland Berger 2014) . There are many country-specific policies either inhibiting or accelerating the supply of e-learning. For example, back in 2010, China granted domestic firms the ability to issue online degrees, but did not permit this for foreign firms. Malaysia has launched an initiative to create a national online learning portal the goal of which is to offer 30% of all higher education online by 2015.

The number of virtual universities has also increased in many countries on multiple continents through new policies recognizing virtual degrees (Adkins 2011). Many of the policies are driving new players into the ecosystem. Future policies will have the power to increase or decrease the attractiveness of the e-learning market both regionally and globally. This will also have the potential to affect suppliers in corporate e-learning market directly or indirectly.

Standardization

Standards drive the adoption and supply-side of e-learning. Standards are developed to ensure that content, services, products and technologies are interoperable, portable and reusable. Standardization is in a critical role as to why the e-learning ecosystem has gained momentum.

The World Wide Web Consortium (W3C) standardized Hyper Text Markup Language (HTML) that is now the de facto standard for formatting and displaying content in web browsers. HTML is accessible, interoperable with various browsers and works across various platforms. Many e-learning content suppliers have relied on Adobe Flash authoring tools in the past, but HTML5 is enabling rapid development of content to a broader range of platforms including mobile devices.

IMS Global Learning Consortium aims to ensure that learning content is discoverable, reusable and interoperable when moving it between administrative systems, typically learning management systems (LMSs). The IMS Learning Tools Interoperability standard (IMS-LTI), used by many administrative systems establishes a standard for the integration of applications and content with learning platforms. Overall, the attempt is to offer a standard that allows applications and content to be moved between different learning platforms from various providers. IMS specifications are based on the Extended Markup Language (XML) standard from W3C. (IMS Global Learning Consortium 2015)

As various specifications emerged from W3C, IMS, AICC and others, such as the Institute of Electrical and Electronics Engineers Learning Technology Standards Committee (IEEE LTSC), there was a need to combine the various specifications into one functional standard for the next generation of e-learning. The Advanced Distributed Learning (ADL) initiative started this work. The result was the Shareable Content Object Reference Model (SCORM). (Kilby 2015)

The Shareable Content Object Reference Model (SCORM) is a collection of standards and specifications for e-learning content. The objective of SCORM was to solve content interoperability, reusability and durability challenges that were encountered by corporations and institutions when changing learning management systems or using

content that was developed by different suppliers. The SCORM specification is comprised of interrelated technical standards and guidelines on how interoperable, plug-n-play, browser-based e-learning content can be created. This allows for the reuse of content in various learning management systems regardless of what tools have been used to create the content, as long as they comply with the SCORM specification. SCORM was originally introduced in 2000, while the first widely adopted version was introduced in 2001. The latest version of SCORM has been published in 2009, SCORM 2004 4th Edition. (ADL 2015) SCORM is not linked to any specific programming language or platform. The majority of implementation is done using JavaScript, XML, and HTML. SCORM does not consider instructional design or define any specific LMS functionalities. (Kilby 2015)

The Experience API (also called Tin Can API) is the latest e-learning software specification by ADL and it is considered an important complimentary standard to SCORM. The open source Experience API specifies the interoperability of data produced by various technologies. The main objective of the specification is to create an interoperable specification of data regarding learning experiences that can be used widely in Learning Record Stores (or learning management systems) to track and measure both formal and informal learning activities. This way even informal learning through web searches and learning portal can be tracked, and learner needs can be better analyzed (ADL Initiative 2013). At the moment, there are over 160 adopters of the specification (Rustici Software 2016).

Interest in content and system interoperability has been an important area of focus in the e-learning ecosystem. Now, there is also increasing interest in learning accreditation. This has resulted in exploratory efforts to offer alternative accreditation and credentialing systems, such as open badges. The Open Badge Infrastructure (OBI), an open technical standard, is one example of this trajectory. The objective is to drive widely recognized, standardized learning achievements that verify skills and competencies across countries and educational sectors. All in all, the recognition of learning that happens in various contexts (such as formal, informal and social learning) is set to drive greater learner interest in lifelong learning. (The Mozilla Foundation 2012)

In an industry such as e-learning, standards play a crucial role in the ecosystem. Standards benefit the whole ecosystem as various stakeholders can rely on interoperability and cross-platform support. However, new standards emerge and old ones are refined and some may be substituted over a short time in a field of rapid development.

4.3 E-learning market overview

The global educational industry consists of sectors, such as pre-K-12, K-12, higher education, vocational, government and corporate. In 2015, the educational industry's total expenditures were estimated at 5.5 trillion USD. Out of this, the corporate training sector is estimated to account for 275 billion USD in 2015. (IBIS Capital 2013b) Corporate training expenditures are highly concentrated in Europe and North America. Developed Asia follows these regions. Overall, European and North American corporate training expenditures accounted for over 70% of the corporate sector's

expenditures in 2011 (IBIS Capital 2013b). This accumulation of expenditures is still strong to this day, although other regions are experiencing growth.

The e-learning industry has shown consistent growth over the years. E-learning expenditures (including corporate, higher education and K-12) are estimated at 167 billion USD in 2015. The demand for e-learning products is high in developed countries, and now adoption of e-learning is taking place in developing economies as well. Out of the entire e-learning market, the estimated corporate expenditures on e-learning vary between 40 billion USD up to over 60 billion USD in 2015 (IBIS Capital 2013b, Roland Berger 2014). Estimates vary largely based on what expenditures of corporate training are associated with e-learning.

The corporate e-learning market (expenditure on e-learning) is expected to grow globally at an annual compound growth rate (CAGR) of 13% through 2017 (Roland Berger 2014). Docebo (2014) list a similar figure of a CAGR of 12% from 2012 to 2017 for corporate e-learning. Growth figures depend a great deal on what technologies are considered as e-learning. For instance, if gaming and gamification tools are included in the market figures, growth rates are even higher. Overall, the corporate e-learning market growth will be driven by the rise of digitization and the adoption of more advanced technologies that can be used to improve training and learning methods and enhance productivity in corporate context (Technavio 2016).

Corporations are increasingly using technology in their training programs and on average, 19% of corporate training budgets are spent on e-learning and learning technologies (Towards Maturity 2015). Revenues in the corporate e-learning market have remained high from 2011-2016. There are indications that the demand for corporate e-learning will remain stable, while growth rates and buying patterns will vary depending on the corporations' location. Large corporations in mature markets are making the most impact on the market even though buying cycles tend to be longer.

Buying patterns and outsourcing activities depend on the size of the corporation and the product category that is examined. In the U.S. market, 13% of L&D budgets went to outsourcing according to Carroll et al. (2015). If we examine outsourced custom content more closely, we find that it has contributed to 15% of budget expenditures in 2015. Here, we can conclude that just below 2% of the total L&D budget goes to custom content development. Overall, these figures depend on the factors introduced above and on the market under examination.

The U.S. is the forerunner in corporate e-learning implementation. In 2011, 77% of corporations based in the U.S. offered e-learning in their professional development programs. During the same time in Europe, 51% of corporations reported that they delivered e-learning to over half of their employees. Globally, the penetration of e-learning is increasing in all company sizes, large, mid-size and small. (Roland Berger 2014, IBIS Capital 2013a)

Corporations in developing countries do not follow the adoption patterns of corporations in the United States. As stated, the characteristics of the e-learning market vary vastly between different regions. In the U.S. there are indications that large corporations are outsourcing less custom content, while small and medium-sized businesses are outsourcing learner support resources (Training Magazine 2015). In Asia, e-learning is increasingly being used by corporations, and the demand for custom e-learning content and technologies is estimated to rise and bring growth, especially in the Indian market (Docebo 2014).

In Latin America, the majority of e-learning content has been imported from outside the region, but now domestic suppliers have started to gain market share. As a future direction, international suppliers will try and capture market share by acquiring domestic suppliers. Western Europe has seen a clear shift to small and medium-sized businesses adopting learning technologies. This is part of the low barrier of entry enabled by cloud services. Contrary to the U.S., large corporations in Western Europe have experienced a slight shift to outsourcing e-learning content development from in-house development. (Docebo 2014)

In general, Eastern Europe and the Middle East are experiencing an increase in e-learning adoption in the corporate segment. Finally, the African market is changing rapidly and market characteristics are changing in as little as a few years. However, there are still factors, such as lack of IT infrastructure and Internet connectivity in some regions hindering overall growth of the market. (Ambient Insight 2016, Docebo 2014)

The global education market has been rigid and slow to develop due to the constraints of educational institutions as well as the model of top-down education planning. Nonetheless, the e-learning industry is experiencing rapid growth and increased competition is driving new innovative start-ups on to the scene. The corporate training market is the most cyclical within the education industry. Investment trends in the corporate e-learning market are reflected by the state of the economy. Figure 4.4 illustrates direct investments into the corporate e-learning market from 1999 to 2012. This includes venture capital, angel investors and private equity investments (IBIS Capital 2013b). When a company's industry slows down, corporate training is often one of the expenses that is cut. This reflects directly on the investment trend of the industry. Once a business grows, training investments increase as new employees are hired. As a result, industry investments recover, typically driving the increase of market entrants.

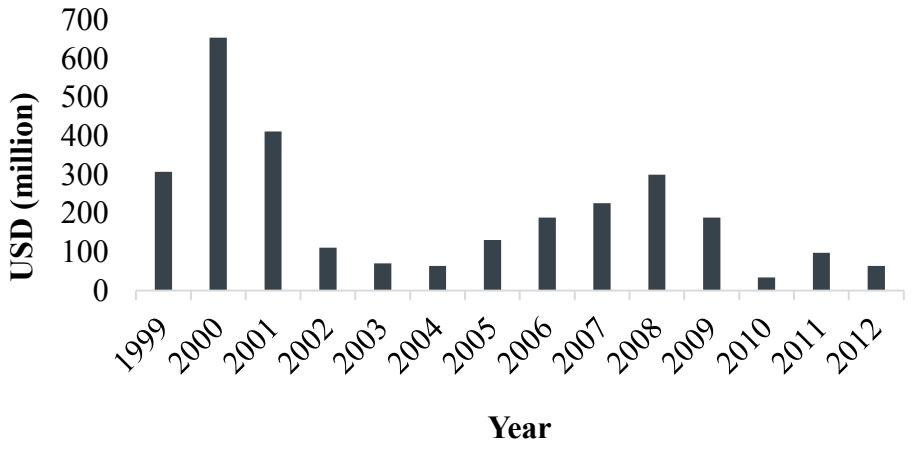

Figure 4.4: Approximate direct investments in the corporate e-learning market 1999-2012 (IBIS Capital 2013b)

An estimated 6 billion USD of venture capital has flowed into the e-learning industry through 2009-2014, and e-learning evolution is being driven by various small and large businesses, ventures and universities. Overall, the academic e-learning market leads the corporate e-learning market by a substantial amount in direct investments. The corporate training sector's investments have lagged behind those of other educational

sectors, therefore, it is estimated that the corporate e-learning market will be a viable investment opportunity in the future. (Docebo 2014)

Currently it is estimated that there are 3,000 companies in Europe involved in the e-learning market, spanning from content suppliers to technology platform developers. Media companies are also entering the e-learning market. The spectrum of business models covers various approaches to learning, from blended learning to mobile learning. The fragmentation of the market indicates that it is still quite immature and also highlights that there are substantial differences in buying patterns between countries. A typical future characteristic of a fragmented market with overlapping businesses is industry consolidation, which will allow businesses to expand geographic reach, scale and offerings. This is what is predicted to happen in the e-learning industry. (Roland Berger 2014)

4.4 E-learning supplier market

The e-learning industry can be divided into a variety of providers, enablers and suppliers operating in various subsectors. Depending on the perspective of the subsector analysis, subsector divisions regularly acknowledge content, authoring tools, technology, management systems, services and distribution. However, the lines between various subsector suppliers are fading, as suppliers diversify and branch out across multiple subsectors. In addition, new innovations and business models are continuously entering the ecosystem causing disruptions, particularly, advances in technology and the rapid development of the e-learning service industry.

Figure 4.5 illustrates the e-learning value chain, adopted from (Rogers 2009). Here, we can see the central parts of the e-learning value chain. The business processes in the e-learning value chain are the basis for how value (or utility) is created in e-learning products and up to the customer. It is important to understand how different parts of the value chain work. This will shed light on how they can be improved or disintermediated.

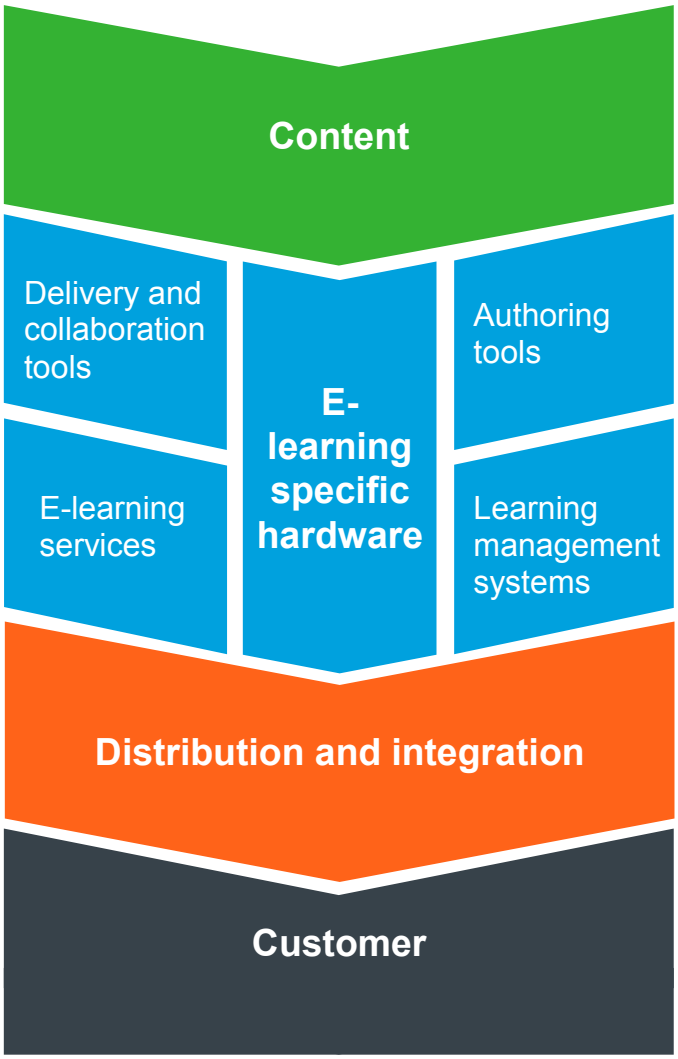

Figure 4.5: E-learning value chain (Rogers 2009)

The value chain provides a good representation of the e-learning supplier market. Suppliers can be found in each part of the value chain, and there are players that manage multiple parts of the value chain. Each good and service along the value chain can be produced either by a third party supplier (outsourced) or by a corporation themselves. E-learning content, learning management and distribution create the backbone of corporate e-learning, although in many corporate cases, distribution and integration is handled by the content supplier and/or the learning management system. E-learning specific hardware is also highlighted to be at the core of the value chain. (Rogers 2009)

What products and services do corporations use? The Towards Maturity (2015) and Training Magazine (2015) reports found that corporate L&D currently use fairly traditional approaches to e-learning. The top e-learning products and technologies, used by over 70% of corporate respondents are e-learning content, learning management systems, virtual classrooms, custom in-house e-learning content, job aids and enterprise-wide information systems. Generally, we find that in addition to e-learning content, technologies enabling social and collaborative learning and supporting learning management and administration are key e-learning products in the market. These reflect fairly directly on the central parts of the value chain depicted in figure 4.5.

Newer learning technologies are slowly gaining momentum and many corporations are currently experimenting use of technologies, such as MOOCs, learning analytics and performance support systems. Overall platforms, services, tools and other hosted services are in strong demand. During the three years prior to 2015, faster than expected traction has been seen in cloud-based content, VoIP services, job aids, immersive games and complex simulations (Towards Maturity 2015).

The next sections will introduce central subsectors and technologies that affect corporate e-learning.

4.4.1 E-learning content

The content sector is the largest subsector in terms of revenues in both the overall e-learning and corporate-side market (Docebo 2014, Business Wire 2016). Content suppliers author and publish intellectual property, typically self-paced e-learning content that is distributed to corporations and learners through a learning management system or other platform. Growth of the content subsector can be contributed to the corporate promotion of self-paced e-learning content (Technavio 2016).

E-learning content can be divided into two distinct product categories, packaged content and custom content. Packaged content is generic course-ready content (also called off-the-shelf content) that can be licensed to multiple buyers. Custom content is content that is custom made for a single buyer according to the customer's specific needs. Packaged content is generally used for the provisions of generic functional and process-related training. Corporations require custom tailored solutions to address their specialized training and skills programs. As specialized knowledge and skills are not always available from third-parties, many corporations create in-house e-learning content. Overall, revenues in the e-learning content subsector specific to the corporate training market have shown steady growth over the years following 2011. (Docebo 2014)

The content subsector contains a diverse range of suppliers. Domestic suppliers, major national and international suppliers, trans-regional suppliers and business process outsourcers with global reach. Large trans-regional suppliers serving entire regions as well as numerous smaller domestic suppliers offering localized content have gained momentum in the market. The lack of localized content has hindered e-learning growth in the past, but there are signs that especially domestic suppliers are experiencing market growth and gaining market share. Reason for this include that large suppliers are not able to focus on localized efforts, and domestic suppliers can create content that is better designed for their customers' culture. These new providers are mainly content suppliers, not focusing on other e-learning products or services. Self-paced e-learning content is one of the main focuses as it provides higher profit margins than instructor-led content. Also corporations have been interested in more efficient training solutions that self-paced content can provide compared to instructor-led content. Overall, large companies are the top content buyer in the corporate segment. (Docebo 2014, Adkins 2011)

New disruptors, such as mobile network operators, content aggregators, game developers and open source content suppliers, are also entering the market. Competition is increasing and content developers are finding it more difficult to generate significant value over their competitors. Specifically in the U.S., product commoditization is taking place. Although demand is high and large volumes of products are sold, the revenue growth of e-learning products is flat or even decreasing. This is also known as

price erosion which is for one, due to the lack of product differentiation. This is occurring especially in self-paced packaged content products. Due to the vast range of suppliers, future predictions include the increased stress on content modularization. This would allow for corporations to more freely pick content from a variety of suppliers best suited for their needs without being tied to a single supplier. This is one area that standardization bodies and new market disruptors are addressing. (Adkins 2015a, Roland Berger 2014)

As the competition in the e-learning industry increases, more players with innovative e-learning content are entering the market. These innovative approaches include gamification, simulation-based learning, game-based learning, cognitive learning and mobile learning. The market is seeing low cost, innovative e-learning content that essentially has no barriers to adoption enter the market. This is leading to product substitution in regions, such as the U.S. where corporations are adopting more advanced rich media content instead of traditional self-paced learning solutions (Adkins 2015a).

4.4.2 Online education providers

Universities and publishers are large players in the content subsector and they address the whole e-learning market, not only the higher education sector. They have spread to other parts of the value chain as well, in efforts to directly provide products and service to corporate customers. Publishers have undertaken massive content digitization efforts, as print-based media has been converted to eBooks and university courses have been digitized giving birth to massive open online courses, or MOOCs. However, as infrastructure and learning technology is implemented more widely, buyers tend to prefer more personalized interactive multimedia content. (IBIS Capital 2013a)

Publishers are aiming to accredit or brand their content with recognized authorities to provide value. (IBIS Capital 2013a). Accreditation has the potential to boost e-learning adoption, if certificates are issued cooperatively by suppliers and companies, and even greater potential if credentials are widely recognized. Employees will earn accredited qualifications that they can achieve on their own time, also increasing employer attractiveness in the labor market. In addition, companies could manage competencies more efficiently and learning suppliers could better offer targeted products to companies (Roland Berger 2014). As mentioned before, efforts such as open badges are offering alternative approaches to accreditation, as they are open to all suppliers and not produced by partnerships with proprietary institutions, such as universities.

There is a large array of new learning providers in the market. As stated above, these new providers are spreading to various parts of the value chain. Well-known universities and non-profit/for-profit organizations are providing online offerings in forms, such as Massive Open Online Courses (MOOCs). MOOC providers include players, such as Coursera, Udemy and EdX. There are also providers offering online expert video libraries (Lynda.com, SkillSoft, BigThink), learning marketplaces (OpenSesame), immersive learning platforms and mobile games.

MOOC offerings range from free or paid courses to full online degrees. Accreditation and certification services are the major source of revenue for MOOC providers. Credentials or certificates that signify a certain level of competency are sold to the student after course completion. This business model is very typical for these products. These providers are no longer only targeting higher education and consumers, but new

platform, subscription and service-based business models have emerged to target corporate clients as well.

MOOC providers are handling all parts of the e-learning value chain from content creation to distribution through their own learning platforms similar to LMSs used by corporations (IBIS Capital 2013a). There has been a clear increase of MOOC adoption in corporations during the past two years. This can be attributed to cost reductions gained through large scale and course-ready offerings that MOOCs offer to corporate training. MOOCs also offer low cost certification and leverage various technologies, driving adoption of big data, analytics, gamification and cloud. On many fronts, MOOC providers are competing with various suppliers in the value chain, especially with LMS providers (Research and Markets 2016). Factors that negatively affect the adoption of MOOCs are that corporations have invested in their own LMS, corporations are creating custom in-house content or they are getting custom external e-learning content for their business needs (Towards Maturity 2014).

4.4.3 Authoring tools

Authoring tools provide the means to create standardized e-learning content that can be used in various learning environments and systems. Thus authoring tools rely heavily on employing prevailing standards, so that content is interoperable across platforms and systems. There are a vast range of e-learning authoring tools on the market. However, the dominant tools in the past have been rapid conversion tools that can convert content, for example PowerPoints, into SCROM compliant e-learning packages and screen capture utilities that can be used to create self-paced learning content cost effectively (Adkins 2015a).

One of the key developments has been a clear shift to the demand of hosted authoring tools from stand-alone solutions. Many hosted authoring tool buyers choose a tool that integrates with their learning management system with the help of SCORM, AICC and equivalent industry standards. More recently open source and general purpose tools have been gaining market share, inhibiting growth of commercial products. Prices and consequently revenues have decreased, but in return sales have increased. (Adkins 2015a)

There has also been a new wave of authoring tools for simulation-based, virtual reality, augmented reality and game-based learning that have been gaining momentum. These tools are providing cost effective ways to create the next generation of technology-enhanced learning solutions (Adkins 2015a). As HTML5 is replacing older standards and providing the means for the rapid development of cross-platform learning solutions, next content creators will need to focus on the subsequent generation of standards that is being led by the Experience API (IBIS Capital 2013a).

4.4.4 Management systems

In addition to e-learning content, the main learning technology used by corporations is a learning management system. The management system subsector consists of players that provide management system software platforms, typically a learning management system or other tools used to manage learning, such as assessment and analytics tools. Many LMS suppliers also offer e-learning services and products (e.g. packaged content) on their learning management platform, directly competing with other suppliers extending the management system subsector.

The management system subsector has experienced substantial growth in recent years, as both buyers and providers have increased in the market. The overall LMS market continues to be highly fragmented, comprising of large providers to niche players, and from proprietary software solutions to open source offerings (IBIS Capital 2013a). However, the corporate LMS market shows less fragmentation than the overall LMS market. Many big corporate LMS providers have been consolidated and the top 10 LMS providers in the corporate market account for nearly 50% market share (Mallon, Wang-Audia et al. 2014). However, there are still small LMS providers entering and succeeding in the market with new innovative features to LMSs.

Learning management systems are widely used by corporations today. The Toward Maturity (2015) report found that LMSs are used by 79% of corporations. The most likely user of a learning management system in the corporate sector is a corporation in the technology industry. Large corporations are the most lucrative customer in the LMS market, accounting for over 60% of the top 30 providers' overall revenues. The corporate-side LMS market alone is estimated at 2.5 billion USD in 2015, the same size as the entire LMS market just in 2013. The overall size of the LMS market is estimated to more than triple from 2013 to 2018. (Medved 2015a)

Medved (2015a) reports that out of the total LMSs in use (all industry segments), the majority are hosted, a total of 87%. In fact, the most significant change in the LMSs has been the shift to subscription-based, software-as-a-service cloud platforms, especially on the corporate side. The LMS market is highly competitive and products between commercial LMS providers are very similar. LMS providers are trying to differentiate themselves from competitors in the area of user experience. Features, such as career and talent management as well as learner-focused content, MOOCs, mobile learning, social features and video-based learning are being integrated with learning management systems in an attempt the differentiate product offerings (IBIS Capital 2013a). This is also increasing competition, as LMS providers are diversifying their offerings to a wider range of e-learning products and services.

Corporate customers are showing interest in certain LMS features and functionalities. The big data trend is moving to LMSs and manifesting in two forms. Learning analytics are used to follow key performance indicators (KPI), such as the return on investment (ROI) of corporate e-learning initiatives. In addition, corporations are showing interest in gathering learner data to help them determine the effectiveness of training as well as enhance user learning paths and create adaptive learning environments. Consequently, this reflects to the requirements of e-learning content and standardization.

The rapid adoption of the Experience API by established e-learning suppliers is signaling an increased interest of learner data collection. Big data and machine learning are paving the way for intelligent adaptive learning environments and smart tutoring systems, although it will take time before these approaches gain major traction. For example, the LMS provider Saba already integrates machine learning in their cloud LMS (Towards Maturity 2015). Solutions for learning analytics through machine learning in artificial intelligence is expected to increase in the future. Overall, LMSs are being used in new ways, such as record systems that allow corporations to offer talent management and track informal learning traction (IBIS Capital 2013a). Blended learning, mobile learning and social features are also rising in importance as features that corporations want in their LMS. The main driver of dissatisfaction with LMSs is that they lack a certain feature (Medved 2015a).

Corporations are showing an interest in a single corporate-wide system. Integrated LMSs or talent management systems are both concepts that integrate a vast variety of management and learning features into one single platform. Many current LMS providers are expanding into this new area. There has been a slight increase in the number of corporations adopting integrated LMSs and systems that support the Experience API in 2015 (Towards Maturity 2015). One of the top growth predictions from corporations themselves is that online evaluation of e-learning business impact will rise to higher importance in the coming years (IBIS Capital 2013a). Also, corporations seem adequate that future LMSs must integrate with other enterprise systems, such as ERP, CRM, video-conferencing tools and other legacy systems (Docebo 2014).

Overall, low differentiation possibilities are leading to price competition. Prices of LMS systems are going down which is having a positive impact on sales (Adkins 2015a). The LMS market will continue to gain traction in emerging markets up through 2020 (Markets and Markets 2015). The major drivers of LMS growth is the adoption of e-learning, and the introduction of cloud-based LMSs. The hosted formula is allowing corporations to minimize capital and operational expenditures, resulting in large, medium and small size businesses adopting software-as-a-service (SaaS) platforms (Bersin 2014, Docebo 2014). At the moment it seems that LMSs are here to stay as the dominant platforms for corporate learning.

Today, LMSs allow corporations to track learning and support business growth. The changing corporate environment creates new requirements for future LMSs that can allow businesses to reach their full potential. As Stone and Zheng (2014) conclude, next generation LMSs must be open, personal, social, flexible as well as support learning analytics, and properly support the move to mobile computing. In addition, new business models and LMS technologies are changing the field, for instance LMSs with e-commerce capabilities have the potential to become revenue creating systems rather than cost-driving systems (Docebo 2014). As the main platform for corporate e-learning, LMS providers are in a favorable position to further expand and promote their corporate offerings. However, the future of LMS seems to suggest that the continued support of various standards and integration of external content will allow for the e-learning ecosystem to evolve and benefit all parties: corporations, LMS providers and external suppliers.

4.4.5 E-learning technologies

Evolving e-learning technologies affect all parts of the e-learning value chain. They have potential to create novel opportunities for suppliers in the form of complementary or even substitute products and services. New technologies shape underlying e-learning hardware. This reflect to content and consequently, authoring tools. Changes in approaches and uses of technologies can offer new types of e-learning content, which must be distributed and integrated in new ways. Thus, it will also affect parts of the value chain, such as learning management systems. The next part introduces some of the recent developments that have occurred in e-learning technologies.

Social learning

The approach to content is changing. E-learning content is no longer only standalone material; knowledge is created in collaboration with others. Generally, this transition to a social and collaborative web experience has been coined Web 2.0. Web 2.0 is a term

for the next generation of WWW sites and tools that empower a user to access, create, broadcast and share content in an open environment; a transition from the passive role of just reading information from websites.

The rise of Web 2.0 tools, such as wikis, blogs, podcasts, social networking, multimedia archives, synchronous communication, virtual worlds, games, mobile learning and open content has boosted the amount of tools and content available on the Internet (Bates 2010).

Corporations have also started to understand the implications of learning as a social experience and to adopt Web 2.0 content, tools and platforms. Content curation will increase in importance to add value to social content, which could create new business opportunities and rise of new market entrants (IBIS Capital 2013a). After online training delivery, facilitating social and collaborative learning is the second leading area where recruitment is planned for in corporate L&D teams. Overall, social networking tools have increased in use for corporate learning and development. Learning and development professionals in corporations predict that the some of the most significant increases in social learning approaches will be in learning communities and communities of practice in the coming years (Towards Maturity 2015).

Gamification and immersive learning environments

Gamification (applying game-like characteristics to non-game contexts) is estimated to grow in unison with the interactive "edutainment" industry. This will create new opportunities for content suppliers to add value to their products. At the moment, 19% of corporations are reported to be using gamification in their corporate e-learning, such as achievement goals and point-based systems. A further 37% estimate that they will be using them in the next 2 years (Towards Maturity 2015). Both IBIS Capital (2013b) and Roland Berger (2014) estimate that gamification will gain adoption in a 5 to 10 year time frame from a starting point of 2013-2014.

Immersive learning offers simulated environments by the use of virtual reality or training overlays though augmented reality applications. These approaches provide a whole new generation of e-learning opportunities for suppliers, including current content suppliers and game developers. Interaction with virtual environments and two-way interaction between learners allows for new ways to learn through technology, overcoming some of the limitations of traditional forms of e-learning. Initially, these technologies will be of most value in industries such as aviation.

Immersive learning environments, which include game-based, simulation-based or 3D virtual world-based learning, were among the most experimented new approaches to learning in corporations during 2015. Currently 31% of respondents stated that they were using a form of immersive learning. An additional 53% estimated that they will be using immersive learning environments in 2 years. Although changes rarely occur within planned timescales, we see a strong indication that corporations are interested in immersive learning experiences (Towards Maturity 2015).

Several technology companies, such as Google and Microsoft entering the immersive technology market and establishing software development platforms for immersive technology, for example, Google Daydream for virtual reality and Windows Holographic for augmented reality applications. These technology enablers may have a noticeable effect on the evolution rate of the ecosystem surrounding these technologies. In contrast, there are established specialized players in the market, such as Immerse

Learning, which is developing a proprietary learning platform that is used for various industry uses in language training (IBIS Capital 2013a).

Mobile learning

The increased number of mobile devices has shifted thinking to address the possibilities of learning through mobile devices (m-learning or m-education). M-learning is allowing for learning to occur at any time and any place with a mobile device, such as a mobile phone, PDA or tablet. This transition to mobile sets certain requirements for content, LMSs (such as the ability to scale to mobile devices) and other crucial parts of the e-learning value chain.

Corporations in developed countries have been slow adopters of mobile learning as PCs are the dominant technology that information workers are using for learning. Corporations in emerging markets with mobile-only infrastructure are able to leapfrog directly to mobile learning. In this case the distribution of learning is only limited by the reach of the telecommunications infrastructure. (Adkins 2015b)

Subscription-based mobile learning content is sold as a service in many countries, in both consumer and corporate segments. In 2008, mobile learning value added services were virtually non-existent, and today more than 600 million subscribers use mobile learning value added services (Adkins 2015b). Mobile network operators, device manufacturers, and content suppliers are core players in this subsector.

Recently, there has been traction in corporations especially for augmented reality performance and decision support products specific to industries, such as warehousing, manufacturing, energy, aviation, automotive, clinical and field-based companies. As mentioned above, AR and VR software and hardware is being advanced by large mobile industry companies, such as Microsoft, Google, Sony, Intel, Apple and Qualcomm, strengthening the prospects of the technology also in mobile learning contexts. (Adkins 2015b)

5 Scenario planning

This chapter introduces the scenario construction process. The findings are expressed as key trends and uncertainties that summarize the understanding of future corporate e-learning.

5.1 Scope, time frame, major stakeholders

The thesis focuses on the global corporate e-learning ecosystem. Scenario planning examines the global corporate e-learning ecosystem from the perspective of a small-sized learning solution supplier headquartered in Helsinki, Finland. This supplier is the key stakeholder of this thesis. The supplier operates in the global e-learning corporate segment, offering packaged content, custom content and training services.

The selected time frame for the thesis is ten years. This was decided on together with the management of the key stakeholder. Five years would have been too short in terms of any major technological shifts to actualize. Over ten years would have been too long to anticipate or predict the amount of change that will take place in the industry. Ten years is ideal for forming an overall view of emerging and maturing technologies and to even consider a shift to new technologies, as ten years is close to the duration of a fixed investment business cycle.

5.2 Expert interviews

Trends and uncertainties were initially identified in the literature study. Expert interviews were conducted to gain a deeper understanding of the identified trends and uncertainties. The expert interviews were used to identify new trends and uncertainties as well as to validate and develop an understanding of identified e-learning trends and uncertainties. Six expert interviews were organized during the spring of 2016 (30.3-28.4.2016, Helsinki, Espoo). Appendix A lists the interviewees.

The interviews were conducted by introducing the scope of the thesis followed by an example of a trend and uncertainty. The interviews consisted of open discussion about trends and uncertainties, without introduction of the initially identified trends and uncertainties from the literature study. This aimed to identify new trends and uncertainties. Over the course of the interview follow-up questions were asked to validate trends and uncertainties that were identified during the literature study. Appendix B presents an outline for interviews, which shows an overview of the planned course of an interview.

The interviews varied according to the area of expertise of each interviewee. Some level of saturation was found in the trends and uncertainties of gathered interview data. The interviews succeeded in improving the understanding of the e-learning industry. However, no clear scenario axes could be identified during the interviews.

5.3 Key trends

Key trends are factors that are certain or almost certain to happen in the future and that will have an impact on the corporate e-learning ecosystem. Initially, a large set of trends was found. The expert interviews were used to identify new trends and acknowledge and deepen understanding of trends identified in the literature study. Trends were grouped into PEST categories, analyzed and prioritized based on the scope of the thesis. The most important trends were selected as key trends that are used in the scenario construction process.

5.3.1 Political / regulatory trends

- **PT1: Standardization bodies are driving open e-learning standards.** Standardization bodies, such as the IEEE, AICC, IMS Global Learning Consortium and ALD are driving open e-learning standards. These standards aim to ensure that open standard-based learning management systems and tools are interoperable, reusable and portable with industry products and that they offer the latest industry requirements. Standardization allows corporations to hand-pick standardized content, tools and services from a variety of suppliers.

- **PT2: Digitization of education is driving supply of digital content.** Digitization efforts are being carried out across all industries in numerous countries. This trend has been going on for years and it will continue. This is driving the increased availability and supply of digital content in a vast range on languages. The availability of content is creating a challenge to content suppliers, as they must be able to create clear value in their content offerings in the e-learning market to justify prices and drive demand.

- **PT3: Government regulation is driving e-learning demand.** Regulatory trainings are a driver of e-learning in both the public and private sector. Corporations attempt to drive down costs by implementing regulated training as self-study e-learning courses. Budget constraints also drive cost savings by reducing travel costs, resulting in increased demand of e-learning**.**

5.3.2 Economic trends

- **ET1: Knowledge-based economy is driving need for lifelong learning.** The knowledge-based economy is built on human capital and intellectual property. Rapid technological development is increasing the complexity of work and creating new requirements for training and development. There are large skills gaps in the labor market, as the number of jobs that require technical skills grows. At the same time life of knowledge is getting shorter. For one, this is increasing the need for individuals to take responsibility of reskilling themselves. Also, complexity is resulting in the need for continuous professional development and development of teamwork related skills. Businesses that invest in continuous professional development of their employees aim to attract and retain talented employees and to gain a competitive advantage through a skilled and productive workforce.

- **ET2: Industry focus is shifting from products to services.** The e-learning market is highly competitive and generic packaged content is already experiencing commoditization in the U.S. market. E-learning suppliers are diversifying their offerings to meet customer needs and to differentiate from competitors. Money is moving towards services, such as platforms and value added service offerings. Suppliers are aligning themselves as service providers rather than product companies. New business models have emerged, for example, successful credential fee-based, freemium-based and subscription-based models.

- **ET3: Globalization is increasing business diversity.** Globalization has resulted in corporations that have a workforce around the globe. This workforce comprises employees from various cultural backgrounds. E-learning suppliers must be able to address various cultures, languages and education levels in their offerings. This is further increasing the need for high quality personalized learning.

- **ET4: Credential-based business models are gaining traction in the education industry.** Businesses are growing interest in tailored recruits, as skill gaps continue in the labor market. This saves businesses a lot of training and development investments later on. Alternative credentials are being developed and pushed to the market by many online education providers, some in partnerships with companies that hire credited students after they have graduated from the course. Many of these business models rely on learners purchasing the credential for a fee. Although it is still unclear how well credentials will be recognized by employers on regional and global levels in the future, course credentials are already creating value for both employers and employees.

5.3.3 Social / cultural trends

- **ST1: Businesses are increasing use of blended learning.** Businesses are using more digital assets for learning. The learning approaches used in corporations has shifted to include more e-enabled courses instead of full classroom-based learning. Efficiency is the key in many businesses when it comes to training. Time and cost savings that result from the use of e-learning together with other approaches are the driving forces behind this. Overall, this is a positive sign for the adoption of e-learning.

- **ST2: Digital natives are increasing in the workforce.** Millennials, the generation of digital natives, are increasing in the workforce. These digital natives are more open to technological trends in their free time and work. Career attitudes have shifted to shorter tenures of work and there is an increase of contingent work, especially in developed countries. The extent of this cultural change must be addressed by corporate training and development and by suppliers who seek to provide value.

- **ST3: Proportion of informal learning is growing.** The corporate goal of providing continuous professional development necessitates that a greater portion of learning occur in informal settings. Personalized, bite-sized, on the job and just-in-time flexibility offered by informal approaches drive cost and

time efficiencies. Online videos, knowledge portals, social networks as well as coaching and mentoring are just some informal methods that are used in the attempt to create a corporate culture that drives continuous learning.

- **ST4: Interacting through social networks and learning communities is increasing.** Social media has spread to all parts of people's lives, both their free time and work. The important social aspect of learning is being utilized through online social networks and tools. People are open to sharing videos and creating knowledge with collaborative tools and platforms. Learning through social interaction is more motivating and more engaging. This has also been recognized in the corporate world as corporate social media platforms and collaborative learning has gained traction, and the overall emergence of professional networks is expected to rise.

5.3.4 Technological trends

- **TT1: Ubiquitous mobile connectivity is increasing.** The Internet is being accessed more often with mobile devices, as these devices become cheaper and more powerful. Mobile network coverage and capacity is improving worldwide. Markets have been established in recent years that are home to nearly solely mobile Internet users. Mobility is creating new opportunities for learning and building demand for a new form of learning specifically designed for mobile use – mobile learning. These learning solutions fit the modern mobile life-style and can utilize approaches, such as just-in-time learning.

- **TT2: Analytics is rising in importance for businesses.**
  Now more than ever, training and development departments need to demonstrate the value of training on business performance and productivity, as budgets are under constant review. Consequently, e-learning suppliers must be able to more aptly show that their services actually deliver promised value. Measuring the return on investment and learning results of training is a growing topic of interest in corporations. Overall, learning should trigger a change in behavior and corporate culture. This creates immense challenges for measuring learning. Mobile devices, machine learning, sensors and big data are some of the technologies which will drive this trend in the future. Increased productivity and performance will be pursued with adaptive learning through intelligent data-driven systems. Overall, the field of machine learning and artificial intelligence is evolving around this trend.

- **TT3: Video content is experiencing large growth.** Video content consumption is experiencing explosive growth. Many of the previous barriers no longer exist. The cost of creating video content has decreased. The capabilities of smartphones and mobile networks has allowed for the consumption of video to extend from desktop to on-the-go mobile consumption. A clear indication of the growth of video learning is that YouTube is referenced as the world's 2nd largest search engine. This trend has already resulted in the rapid increase of global e-learning video content suppliers in the corporate e-learning market.

- **TT4: User-generated content is increasing in use.** Social networks, blogs, wikis, communities, and videos have already transformed the way people share

and build knowledge on the Internet. User-generated content is also being utilized in corporate training and development, as it offers cost effective ways to create valuable content that incorporates business values and culture directly in-house. This trend has been around for a number of years, but continued growth is projected, as the production of content is becoming easier, more cost effective and people are more open to sharing videos and content. Assuring the quality of content is one of the main concerns in the corporate context.

- **TT5: MOOCs are spreading to various parts of the educational industry.** MOOCs were initially focused on higher education. MOOCs were created to generate scalable higher education to global audiences. Now, after the largest hype has settled, MOOC providers are diversifying, and MOOCs have spread to address corporate training as well. Overall, MOOC adoption has increased in corporations during the past few years, but it is still unclear how MOOCs will evolve in the corporate training market.

- **TT6: Adoption of gamification will increase in corporate learning.** Applying game-like characteristics into corporate learning is not a new trend. Now that the initial hype has cooled down around gamification, a new wave of productive and mature gamification learning solutions will increase in corporate learning.

- **TT7: Cloud is driving cost savings and efficiency.** IaaS, PaaS and SaaS solutions bring forth savings in capital expenditures. It seems that the hosted-formula is spreading to all parts of the digital economy. The benefits of cost, flexibility, scalability and rapid deployment and lowering the barriers of adoption and even small and medium-sized enterprises are investing in cloud services.

5.4 Key uncertainties

Key uncertainties are factors that have an impact on the future of e-learning, but are by definition such that it is unclear whether or not they will occur. Key uncertainties were formed in the same manner as key trends. Initial uncertainties were identified during the literature study, before expert interviews. During the interview process, new key uncertainties were identified and the initially identified uncertainties were validated.

The focus was to identify uncertainties in each PEST category and relate the uncertainty to the demand- or supply-side market of e-learning. Overall, a large set of uncertainties were identified. The interviews were used to prioritize uncertainties. All in all, the interviews did not directly provide scenario variables, but helped understand uncertainties and underlying factors that influence the different uncertainties.

The uncertainties were analyzed iteratively. First, uncertainties were grouped under supply and demand. Second, uncertainties were prioritized based on the scope of the thesis. After careful consideration, unrelated uncertainties were put aside. Third, overlapping uncertainties were re-examined or combined. All of the remaining uncertainties are introduced below.

Economic uncertainty

Corporate training and development programs have generally been fairly rigid in adapting to new innovations in the training market. The uncertainty of corporate spending on e-learning was the most common uncertainties to come up in the interviews. This can also be associated with the uncertain atmosphere of the current global economy. However, the majority of interviewees expected that the e-learning market would grow over the examined time period, as did the reports examined in the literature review.

Many uncertainty factors affecting corporate e-learning spending, such as budgets, corporate culture, business size, learning strategies and perceived return on investment came up during interviews. Also, events, such as natural disasters and terrorism were discussed as factors that increase spending on e-learning, as corporate travel is reduced and remote learning is increased.

Globally, there can be substantial fluctuations in e-learning spending between countries and even between corporations in the same industry. This uncertainty creates a baseline for other e-learning demand uncertainties. This uncertainty is a clear challenge to suppliers. However, these momentary fluctuations in the global economy must be ignored as a root cause of a scenario. Thus, the general uncertainty that addresses the overall economic trend over the next 10 years is ruled out of the scenario planning process.

U1. Corporate knowledge sourcing focus: Outsourcing vs. In-house

This uncertainty addresses the control and demand of e-learning content and services. Formal and informal corporate training is typically implemented by both in-house and outsourced training assets. Off-the-shelf training is typically outsourced and custom content and training are implemented by both alternatives. The balance of in-house and outsourced asset-use is determined mainly by available resources, available expertise and costs.

Factors discovered over the thesis work include a decrease in formal e-learning, and an increase in informal learning. Interviews presented factors, such as the increase of on the job learning, user-generated content, social platforms and corporate interest in creating proprietary knowledge. The overall conclusion of interviews was that both insourcing and outsourcing will be leveraged by corporations in the future. However, the factors mentioned above introduce potential for corporations to utilize more in-house expertise. Based on discussions, this uncertainty was formulated.

This uncertainty directly affects the extent and nature of the future demand of e-learning supplier products in specific subsectors. Potential opportunities are created for external service and platform providers, whereas these factors have the potential to decrease overall volume of formal training and custom outsourced content. Suppliers affected by these events need to consider this uncertainty and address it in the future. External suppliers must increasingly create a value proposition that cannot be duplicated in-house.

U2. E-learning supplier power positions: Fragmented vs. Centralized

The supplier power uncertainty addresses the uncertainty of how the e-learning supplier market will evolve. Specifically, will the market retain fairly low barriers of entry and

remain open to global competition or will certain power positions emerge that will result in considerable market power for certain suppliers and increase barriers of entry.

The majority of interviewees stated that the e-learning market, with a multitude of different corporate training and development approaches and tastes, will be capable of sustaining a vast range of content and technology suppliers. At the same time, interviewees felt that differentiation and market visibility will be more important than ever in the future. The clear nature of differentiation possibilities was not elaborated, other than that supplier networks and collaboration was believed to increase. Overall, during the interviews and literature review, multiple power positions were found, although no single position of power in the e-learning market was believed to be more probable than another.

The content market entry barriers have been fairly low in the past. This has generally resulted in fewer possibilities for centralized supplier power positions to emerge. This could lead to the further development of a diverse global corporate e-learning ecosystem. On the other hand, established brands could push to gain a competitive advantage by building strong collaborative networks and partnerships. These supplier networks and partnerships could benefit from brand, accreditation and differentiated service offerings, also contributing to market visibility and quality. Players, such as mobile operators, learning management system providers or tech companies could affect the industry by controlling parts of the value chain, such as e-learning-specific technology or distribution.

At the moment many emerging partnerships in the ecosystem are formed for economies of scale (large general offerings) and scope (product diversification). However, partnerships that cannot be replicated easily due to the control of aforementioned parts of the value chain can result in centralized supplier power positions.

U3. Corporate adoption of immersive learning technologies: Boom vs. Bust

This uncertainty addresses the emergence of immersive learning environments, such as serious games, simulations, virtual worlds, virtual reality and augmented reality. These technologies are anticipated to gain traction in the e-learning industry. There are still considerable uncertainties related to these technologies, and whether corporations will adopt these technologies on a significant scale in the next 10 years.

Corporations have been reported to be testing these technologies. These approaches to learning create new value creation possibilities for suppliers in the e-learning market. The majority on interviewees mentioned at least one immersive learning technology as a trend during discussions. There was a clear consensus among interviewees that immersive approaches do have a place in learning within specific industries and use in areas where work is done in dangerous environments, or the costs of mistakes are substantial or life-threatening. Overall, we cannot talk about a dominant design for e-learning, but a strong technological niche that could provide considerable opportunities for adding value to corporate training.

At the moment, costs are high and content creation times are long, but the benefits to learning in specific niches and industries are evident. Content creation will experience increases in efficiency over the following decade, which should drive an increase in the adoption of these technologies. In a bust, suppliers with substantial investments in a certain technology will endure sunk costs, if they cannot reallocate investments. On the

other hand, early on in a boom suppliers will have a clear competitive advantage as the industry moves forward.

U4. Impact of new business models on supplier pricing power: Low vs. High

This uncertainty addresses the future monetization models that are used in the corporate e-learning ecosystem. A broad range of new entrants and established players with innovative business models have already emerged in the education industry. The education industry has seen the emergence of donation, advertisement, freemium, certificate, revenue sharing, duration, course, platform, and subscription-based business model. Many providers are still testing the viability of business models. Many of the business models are also surfacing in the corporate e-learning market. It is still unclear how they will evolve and affect the dynamics of the market.

In part, this uncertainty overlaps with uncertainty U2, the uncertainty addressing the rise of supplier power positions. Suppliers could establish market power (a centralized power) position through a novel business model. On the other hand, as globalization continues to cause borders to fade in the digital economy, competitors could emerge from low price regions, distorting prices in a fragmented market power scenario. Multiple interviewees mentioned that current business models will evolve and shape the market in ways that we cannot yet know. The amount of free content has already had an impact on business models in other educational sectors. However, on many accounts the corporate sector remains different in terms of prevailing business models.

A positive characteristic of the custom content market (in which the key stakeholder is involved) is that it is less prone to large-scale price competition due to higher upfront development costs and lower scalability. It will remain to be seen how various business models evolve in the ecosystem and if these will weaken supplier pricing power in all subsectors or be limited to certain subsectors or customer industry sectors.

5.4.1 Other uncertainties

Uncertainties U5 and U6 were disregarded as key uncertainties. The reasons for this are explained below.

U5. Corporate responsibility in employee competence development: Low vs. High

This uncertainty addresses the nature of corporate e-learning. Already now, there are signs of changes in the characteristics of careers, particularly in developed countries. Shorter careers result in job-hopping and the amount of contingent workers has increased.

Training employees is an investment for corporations, but if employee retention is low, these investments will fail to result in returns. Businesses could focus on seeking tailored recruits who require less training and can be productive during their short careers. This would shift the responsibility of professional development to individuals, and skill gaps would most likely increase in the labor market. On the other hand, corporations aim to gain a competitive advantage through a skilled workforce, relying on continuous training and development. In addition, the rapid rate of technological change is increasing relevance of personal competence development. This is also expected to drive further interest in widely recognized accreditation and credentials.

Half of the interviewees felt that this is already happening. Personal achievements, credentials and skills are already important self-marketing tools in the labor market. Other interviewees gave mixed responses, for example, stating that the overall effects of this uncertainty were not substantial to the e-learning ecosystem. Overall, the consensus was that corporate employee competence development will continue to drive a competitive advantage, and that investments in these efforts will vary between corporations.

Personally, I feel that the uncertainty reveals a relevant consequence that is occurring in the ecosystem. The important discovery in this is that professional development is becoming an employee-focused activity. Employees are increasingly the ones making decisions on how and when they are trained. In the end, the uncertainty will not be whether competence development is the responsibility of an employee or the corporation, it will involve both parties and drive efforts to produce long-lasting benefits for both employees and corporations.

Learning will need to combine products, services and technologies that employees use in their free time to the corporate setting, converging corporate and consumer e-learning markets. Therefore, the real uncertainty is in how strong the convergence of corporate and consumer markets will be over the next 10 years. To conclude, suppliers in the corporate market should keep a close eye on trends that occur in the consumer e-learning market for early signals of new opportunities. Also, further emphasis must be considered on the benefits of training on the level of an individual employee, not only the large-scale benefits of a corporation.

U6. Convergence of corporate and higher education market: Weak vs. Strong

This uncertainty addresses the increase of competition from other educational sectors. Lifelong learning and the continuum of education is causing the borders between higher education and corporate learning to fade. This has already started to happen to some extent. Learning management systems target both corporate and educational institutions. MOOC providers, once targeting only higher education, have diversified to corporate offerings, addressing both training and recruitment, and international publishing and media companies have diversified into the online education sector, also targeting corporations.

Partnerships between educational institutions and corporations have increased, in part to address the skill gaps in the labor market. The education market has experienced a boom of startups in the recent years. It is still uncertain whether suppliers in the higher education e-learning market will be able or willing to diversify into the corporate market, to look for further revenue streams. The corporate sector may attract companies from other educational sectors. However, the differences in market characteristics are still too large to allow for convergence over all subsectors. Players from other sectors will need to modify and refocus their value propositions and offerings when entering the corporate segment, reducing the attractiveness of entering the corporate market.

The interviewees did not see any large-scale convergence of markets in the next 10 years. Although higher education and corporations are collaborating more extensively, the large-scale convergence of the e-learning markets is unlikely to occur in the next 10 years, as there are still considerable differences in demand and focus points in the different markets. Country specific regulatory aspects slow down the process as well. In

some countries, such as Finland, corporate partnerships with higher education institutions have directly competed with e-learning third party suppliers, for example, in the custom content market. This event cannot be generalized as global, although it may be of some relevance in certain markets.

The future of e-learning may form into hybrid networks of academic, professional and corporate content. Most interviewees felt that higher education institutions specifically entering the corporate market was not a relevant uncertainty in the 10 year time frame, as there were too many barriers and conflicting interests. However, supplier diversification from other educational sectors is a threat that must be considered. Nonetheless, as there are challenges in market entry and vast competition, this event was not regarded of high importance. Overall, these factors resulted in discarding its status as a key uncertainty.

6 Scenario construction

The remaining key uncertainties listed in table 6.1 are cross correlated and their interdependencies are mapped to help identify uncertainties that would fit as final scenario axes.

Table 6.1: Key uncertainties

Category	Uncertainty
Demand	U1: Corporate knowledge sourcing focus: Outsourcing vs. In-house
Supply	U2: E-learning supplier power positions: Fragmented vs. Centralized
Demand	U3: Corporate adoption of immersive learning technologies: Bust vs. boom
Supply	U4: Impact of new business models on supplier pricing power: Low vs. High

Correlations were mapped by creating two test scenarios. One favorable from the perspective of the key stakeholder and one unfavorable scenario containing all factors perceived as negative. The consistency of the test scenarios was used to establish correlations between key uncertainties that are introduced in table 6.2.

Table 6.2: Uncertainties correlation matrix

	U1	U2	U3	U4
U1		?	0	?
U2			0	+
U3				0

Undetermined U1 and U2: If corporate focus shifts so it utilizes more in-house development in learning and development initiatives, this could drive suppliers to seek competitive advantages through a centralized power position. Corporate demand will emphasize platforms and possibly non-proprietary generic content, generally provided by large players. On the other hand, an increase in outsourcing would possibly allow for a rich and diverse supplier ecosystem to flourish, but it does not eliminate the possible emergence of centralized power positions.

Undetermined U1 and U4: Novel supplier business models could create a new attractive market for corporate outsourcing, shifting emphasis away from in-house initiatives. However, the complexity of the two uncertainties does not allow for any distinct correlations to form.

Positive correlation U2 and U4: Upon closer examination, uncertainty U4 is related to uncertainty U2. Centralized power positions stem from market power. In essence this can be related to pricing power of a supplier, the ability to set prices and not sink to pure price competition. If a business model emerges that could affect supplier pricing power, it would most likely rise from a centralized power position. Unlike in a low impact pricing power scenario, most suppliers could generally price their own offerings without the need to set their prices based on a supplier in a power position. This would lead to natural competitive tendering.

From the perspective of the key stakeholder, uncertainties U1 and U2 would be most relevant to consider for scenario axes. Uncertainty U1 addresses the control of e-learning content and, to some extent, defines the demand for external e-learning content and services. Uncertainty U2 addresses the uncertainty of a small supplier's competitive advantage and market power. Uncertainty U3 is a clear separate niche market uncertainty. Uncertainty U4 is not of as high importance in the custom content subsector as it is in more price sensitive subsectors. Also, it is in part considered through uncertainty U2.

The independent uncertainties U1 and U2 are selected for scenario construction. These uncertainties address important competitive aspects of the key stakeholder, and the uncertainties create complex scenarios. These uncertainties apply to both demand and supply in the corporate e-learning market. The two selected uncertainties are used to construct the scenario matrix. The scenario matrix illustration in figure 6.1 shows the variable axes, each scenario title and a short description of the scenario. The scenarios are explained in detail below.

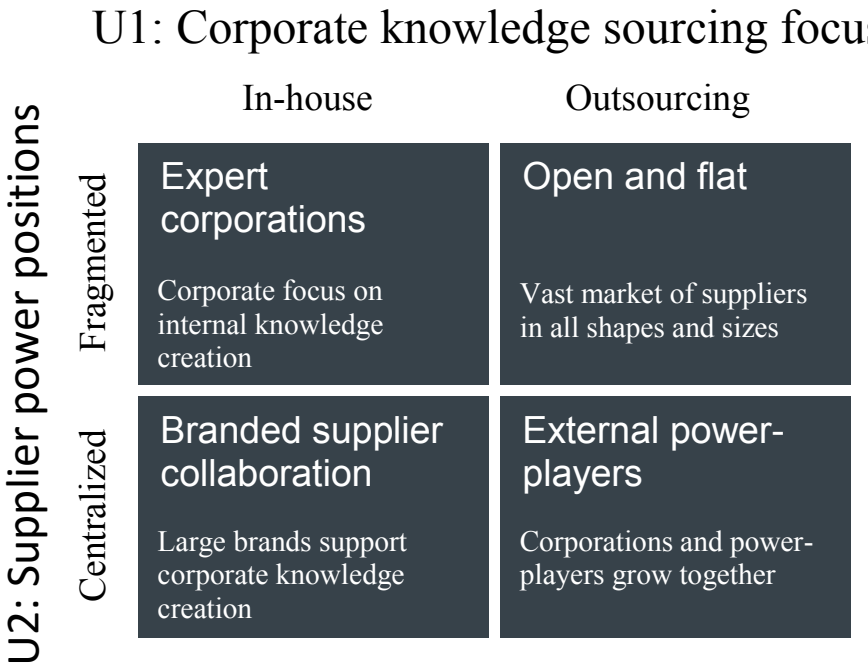

Figure 6.1: Scenario matrix

6.1 Expert corporations

In this scenario, corporations focus on building proprietary knowledge in-house. Much of this occurs in large corporations, but also small- and medium-size businesses find the means to utilize in-house knowledge cost and time effectively with the help of new enabling technologies, such as platforms and hosted tools. E-learning for new enterprise systems, products, business critical skills, competencies and processes are created in-house partly due to security concerns and an overall unwillingness to have proprietary learning assets in the hands of external suppliers, or owned by external suppliers or

partners. The increased weight on in-house development aims to build opportunities for lifelong learning in informal and collaborative settings.

The global e-learning ecosystem is comprised of a vast range of both local and global suppliers. Localized content and knowledge are high in demand as adoption of e-learning continues in emerging markets. This allows both local and global players to co-exist in the same markets. Packaged content and regulatory compliance training still remain a clear market for third party content suppliers and online education providers, as corporations are willing to outsource these for cost effectiveness. The substantial number of suppliers in the market means that corporations can cherry-pick content from various suppliers.

As lifelong learning increases in importance and emphasis is on informal learning, corporations focus on utilizing collaborative learning, user-generated content, social platforms and other informal training approaches that can help develop and distribute in-house knowledge creation more efficiently. This drives demand for e-learning platforms, technologies and services that support efforts to create, measure, share and manage in-house knowledge and training.

Corporate preferences have shifted and less notice is given to formal training approaches. Learning and development focus is on a minimum amount of formal training and more on informal methods that allow personalized learning. There is a possibility that these approaches substitute demand for certain custom e-learning products. In the end, reduction of outsourcing in pure custom e-learning products forces players to re-think their offerings. E-learning services continue strong and drive growth in the market.

Certain strong technology niches have been established, particularly content and technologies that require higher overhead to produce, such things as immersive learning technologies that corporations' seldom have competencies and resources to create in-house. These technology niches offer a value creation possibility to suppliers in this scenario. In addition, corporations with a vast amount of proprietary knowledge have the potential to become e-learning profit centers and sell their proprietary knowledge to consumers and possibly other corporations. Corporations themselves will have the potential to find specific customer niches for their knowledge.

6.2 Branded supplier collaboration

As corporations focus on efforts to build proprietary knowledge in-house, external suppliers aim to gain power positions by aligning with accreditors and forming strategic partnerships in an effort to drive advantages through scale and scope economies. Numerous mergers, acquisitions and partnerships emerge as suppliers diversify their offerings in an attempt to address corporate requirements that are more specific to services that support their in-house learning initiatives. The corporations' demand for platforms, tools and services that benefit their in-house development initiatives, as well as cost effective content solutions to save in-house resources for business critical knowledge creation. This gives rise to branded suppliers - suppliers with a centralized power position that they can use to their advantage in the e-learning market.

E-learning platform and service provider brands are one group of branded suppliers that have the ability to offer a broad range of services, through the management of key parts

of the e-learning value chain. The established ability to aggregate the offerings of a broad range of ecosystem suppliers will allow them to supply a vast portfolio of services. Although corporations have increased their emphasis on in-house development, parts of corporate learning that do not contain proprietary (competitive advantage driving) knowledge are outsourced. Overall, there is still demand for services that drive cost and performance efficiencies when outsourced.

The increased consolidation and collaboration of branded suppliers results in economies of scale and scope. Packaged content, compliance training, software, platforms, tools and services provide considerable opportunities for these large branded suppliers. These branded suppliers gain a clear advantage in the market, as corporations can easily pick the services that they need directly from their diverse portfolios that offer a means of one-stop shopping.

Power positions based on proprietary hardware and distribution channels will also emerge. Players, such as mobile operators and technology companies, gain power in certain markets. We will see mobile operators substantially increase their presence in the mobile learning market. Large technology companies will also increase their presence in the market by bundling e-learning hardware with their own software platforms. Lines between suppliers throughout the value chain will start to fade. Large online education providers, MOOC providers, learning management system suppliers and e-learning content factories will start to find partners and consolidation opportunities in an effort to diversify their offerings and gain brand value through partnerships with accreditors.

The branded supplier global reach extends across borders, although the emphasis on in-house development slows down exponential growth opportunities. As corporations have specific tastes and preferences, a single branded supplier cannot supply the needs of all learning and development requirements. This allows for smaller suppliers to attain customers in certain niches, as different technologies gain different amounts of traction in various corporate e-learning markets. Mastery of the entire e-learning ecosystem is an unattainable objective for branded suppliers. However, branded suppliers will gain a firm market position and a reputation for the quality of their services and the trust for customers have in their services that are used world-wide. Depending on the nature of the power position, even niche players may be affected by branded supplier reach in central parts of the e-learning value chain.

6.3 Open and flat

The generation of digital natives establishes its place in the workforce. A technological upturn is triggered in the corporate e-learning market. Corporations of all shapes and sizes show the green light for the adoption of learning technologies. The e-learning market gains improved traction, as outsourced content, services and technology are in high demand. Suppliers have a chance to capture considerable returns if they can provide strong value propositions for professional development.

The e-learning market is fragmented in structure. Open standardization efforts and low market barriers result in the absence of players with considerable market power. The vast range of different learning technologies in the market allows a broad range of suppliers to flourish, as no single entity can react quickly enough to grasp a dominate position in the fast-paced market. There is no clear dominant design or one-size-fits-all

solution in the ecosystem. Approaches and technologies that corporations use in their learning and development initiatives differ vastly between different countries, regions and industries. The continued immaturity of the market drives onward.

Competition drives players to continuously innovate to gain value in the eyes of corporations. Emerging markets also experience high traction of learning technologies in corporations. Considerable growth in all educational sectors also helps drive the democratization of education and further organic growth of local e-learning suppliers throughout the industry. Corporations in emerging markets are catapulted to new technologies, such as mobile learning.

The new age of corporate learning is personalized and adaptive. To some extent, employees gain authority in decisions regarding the means of learning and development. Overall, we see a strong convergence of the corporate and consumer e-learning market in terms of products, services and technologies. Suppliers focus on doing what they do best. As a result, suppliers are able to specialize, driving diverse supplier niches in the ecosystem. E-learning modularization realizes on a large-scale, as open standardization and distribution efforts allow corporations (and employees) to cherry-pick the content, services and technologies that they wish to use from a rich range of suppliers in the market.

6.4 External power-players

In this scenario, corporate focus does not emphasize either insourced or outsourced e-learning. Corporations use a vast mix of both to get the most benefits out of their learning and development initiatives, much like today. However, certain players in the market gain powerful centralized market power positions. This centralized power is focused on global e-learning players that focus on large general offerings and large multinational players that aim to provide diverse market specific, localized offerings.

The once fragmented market has consolidated in certain subsectors. E-learning supplier partnerships throughout the value chain increase, mobile operators increase their presence in the ecosystem through partnerships with e-learning suppliers. Technology providers partner with e-learning suppliers and accreditors influence recognition of certain brands for quality and portability of credentials. The consumer e-learning market and corporate e-learning market converge as corporate and consumer preferences converge. Partnerships that leverage access to competencies, technologies, distribution and accreditation increase in the ecosystem.

Partnerships have extended to e-learning brands, mobile operators, online education providers, internet players and technology providers. These partnerships build broad differentiated service offerings. Power-players gain brand and quality assurance though partnerships with accreditors, and the ecosystem sees multinational recognition of certain supplier credentials.

Power-players diversify to all parts of the e-learning value chain. This results in considerable efficiencies that reap the benefits of economies of scale and scope. The competition in the ecosystem shifts to competition through value chain agility. Young corporate e-learning markets see the rise of certain power-players. For instance, mobile-oriented regions experience a rise of mobile operators in power positions. In these

markets, mobile operators will be able to supply vast service offerings through their mobile networks in partnership with e-learning suppliers.

Power-players reap the benefits of the ecosystem, whether based on scale economies, platform business models, proprietary technology, controlling distribution or gaining competitive advantages through strategic partnerships (e.g. scope economies). Corporations and external power-players grow together and form long-term relationships, increasing the barriers of entry in market areas dominated by the power-player. Small independent suppliers are not able to compete in the same space as these power-players and, to some extent, lose freedom in the market.

Overall these power-players must gain their power through value chain agility, offer savings in capital and operational expenditures and provide integration with corporate systems and culture through tight collaboration. Failing to do so will allow smaller, more agile and cost competitive suppliers to challenge the power-players in the market. It will be imperative for small suppliers to identify certain niches in which they can leverage their strengths over power-players.

6.5 Niche scenarios

The analyses of the main scenarios reveal that there is one common quality in all of the scenarios. The main scenarios allow suppliers to pursue opportunities untethered in niches, which, to some extent, counter the key uncertainties of the market. Uncertainty U3 (corporate adoption of immersive learning technologies: bust vs. boom) offers a hypothetical niche market opportunity for the key stakeholder in the main scenarios introduced earlier. The immersive learning market is still immature and estimated to evolve considerably over the coming years. In addition, uncertainty U2 (e-learning supplier power: fragmented vs. centralized) is selected as a basis to construct scenarios which address the centralization of supplier power in the immersive learning technology market. These uncertainties are used to construct niche scenarios. The niche scenario matrix in figure 6.2 was formed to illustrate the different scenarios that emerge from the interaction of the two selected uncertainties. These scenarios are discussed in brief below.

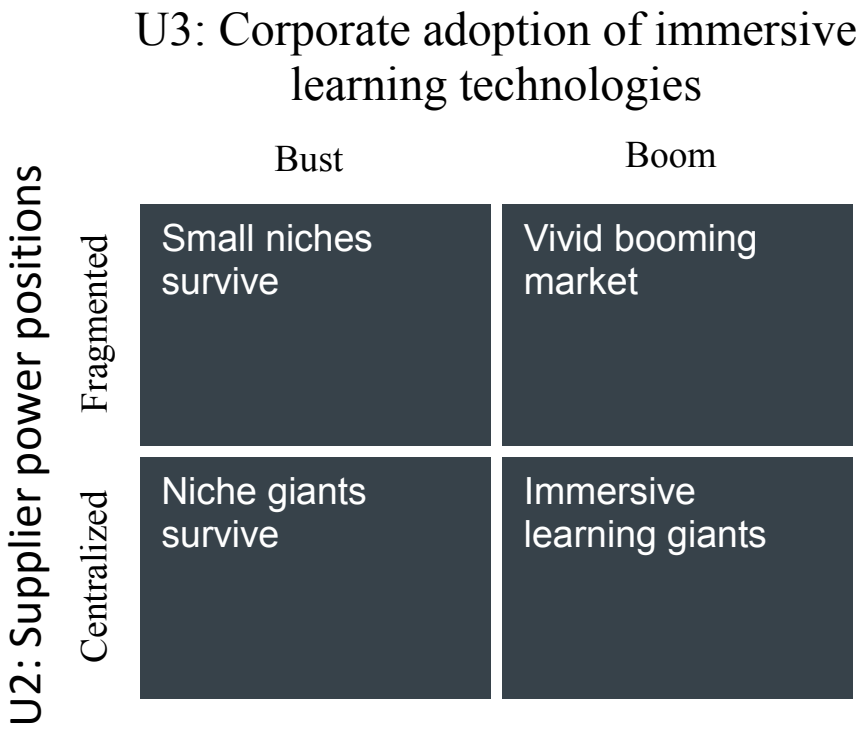

Figure 6.2: Niche scenario matrix

6.5.1 Small niches survive

Corporations remain rigid to change in corporate L&D practices. Traditional conservative approaches remain the general practice in corporate learning and development. The overall lack of vision in the corporate training market delays the adoption of immersive technologies in corporate context.

Experiences offered by immersive learning technologies do not reach the high expectations of corporations. Creating and modifying immersive learning experiences remains expensive and time consuming. Initial corporate interest gives a boost to investments in the niche, but investments dry out after time, as reinvestments into these technologies decreases after the initial boom. The first era of truly consumer-lead immersive learning technologies fails to gain traction on a major level in corporate learning.

Industrial niches, such as aviation, manufacturing and other industries that gain substantial benefits from immersive learning technologies continue to provide a corporate market for these technologies. Industries that can gain clear advantages though large-scale offerings are able to leverage the benefits of immersive technologies.

Suppliers specializing in the needs of a specific industry gain a foothold in their market niche. Overall, there is a reduction of suppliers and a concentration of industry specific immersive learning technology providers. These remaining suppliers stay true to the specialized needs of their customers' industry, which secures a future for their existence. Other suppliers are forced to minimize reallocate investments and competences associated with immersive technologies to other products and services.

6.5.2 Niche giants survive

As other e-learning subsectors and technologies continue to generate the bulk of the e-learning ecosystem, immersive learning remains a small niche dominated by specialized players with central power positions. Only certain corporations have adopted immersive learning technologies, while the majority of uses in corporate learning fail to provide anything else than an initial hype in the market.

At the start of the immersive technology investment hype, corporate competitive tendering favors large branded players that can offer long term support for their large-scale solutions. Overall, the revenues in the immersive technology market flow to large players over time, while small suppliers fail to gain notice in these large budget projects.

As the market fails to boom, branded players are forced to specialize in key industries, focusing their offerings on industry-specific knowledge. There is an increase of proprietary platforms for immersive learning solutions in industry specialized niches. These power positions form though partnerships between platform providers and large content suppliers, such as media companies, tech companies and publishers. Even large industry players outside the e-learning market are extending their knowledge to tailor industry specific immersive learning technologies in partnerships with platform providers.

Large branded suppliers in the market offer tailor-made immersive learning solutions to the industries that have developed key use cases for immersive learning solutions. Immersive solutions are implemented in scalable learning initiatives for large audiences, but fail to boom in the overall e-learning market. Suppliers lock-in customers with long contracts. Small players are not able to establish credible positions in the market and are forced to seek opportunities in other subsectors. Overall, there is less convergence of the corporate and consumer markets for immersive technologies.

6.5.3 Vivid booming market

The immersive learning technology market booms. Starting off from the vast adoption of technologies in the consumer market, the technologies spread to corporate use over time as the consumer and corporate e-learning markets converge. Corporate culture becomes more open to fun and games in the context of corporate learning.

There is a low amount of substitute products that offer the same experience as immersive learning technologies. This drives considerable market growth. Immersive learning technologies are regarded as the “killer app” for the learning strategy shift occurring in corporations. These technologies work as the key component that enables the extended the amount of informal and social learning that corporations are looking for.

Games are used to engage employees in otherwise monotonous learning tasks. Augmented reality offers just-in-time, on the job learning opportunities. Augmented and virtual reality spreads to both informal and formal learning. Corporations recognize the value of the social and collaborative aspects of learning that immersive learning technologies offer. The complaints relating to low levels of human interaction in e-learning are a topic of the past.

The vast variety of devices on the market allow immersive learning technologies to integrate into everyday life, for example, through augmented reality applications. The

evolution of mobile networks and mobile devices allow immersive learning to spread to all places; it can take place at work, at home or on the go. No clear power positions emerge as solutions are created with standardized open software platforms. These standardized solutions can be created by any e-learning supplier. They integrate with different hardware and can be distributed via modern learning platforms and management systems.

6.5.4 Immersive learning giants

Corporate traction increases in the immersive learning technology market. This is partly due to the recognized benefits of immersive technologies and changes in corporate culture that have been paved by extensive adoption of immersive technologies by consumers. But also, this is because of the rise of an ecosystem enabler.

A booming market forms around immersive technologies. There is a key technology enabler or multiple enablers in a power position that create possibilities for these technologies to spread. Large technology players establish platforms for immersive technologies. These ecosystem enablers further the rapid development of a two-sided market and increase the adoption rate of immersive technologies, initially in the consumer market, but also reflecting to rapid spread of immersive technologies to the corporate e-learning market.

Money is on software not hardware, as these enablers leverage the potential of controlling distribution of software to consumers and corporations through their platforms and complementary app stores. These enablers provide a development platform or a channel for distribution, but are also tightly associated with the hardware-side of immersive technologies.

The effects of a two-sided market are not directly applicable to the corporate e-learning market. The proprietary knowledge of custom e-learning content does not in many cases allow for network effects to emerge. However, the market does see the emergence of certain corporate immersive learning products that do take advantage of network effects, specifically immersive learning solutions for off-the-shelf content and platforms that provide communication and social learning capabilities. Events are comparable to the emergence of ecosystems around smartphones.

In addition to enablers gaining power, there can be an emergence of branded suppliers that gain a centralized power position in the ecosystem. Suppliers leveraging network effects can gain explosive growth and gain market dominance as early birds or through partnerships with enablers. Suppliers with established learning curves can benefit from agile production of tailored immersive learning solutions. However, as the market matures, these advantages will dissolve.

Suppliers with an advantage though experience in game development and other immersive technologies can gain an early opportunity to build brand that can later in the maturing market be a key competitive advantage. The formation of an immersive technology ecosystem through the influence of a key enabler is in part beneficial to suppliers, as it could result in a rapid increase in the rate of adoption of immersive technologies as well as create a widely used standardized software platform for development. This could impede supplier attempts to build proprietary platforms in the market, furthering the development of an open market (although the emergence of an ecosystem enabler does not guarantee this).

There are some aspects that could affect suppliers negatively. Enablers may have control over development tools or hardware, resulting in control over supported features of the entire platform. Distribution through an enabler's platform may result in costs and suppliers aiming to monetize content through the platform may find themselves sharing revenues.

Overall, platform business models are more evident in a technology niche as there is a single technology and an ecosystem opportunity that can be formed around the technology. It remains to be seen whether power positions emerge as enablers or as proprietary solution suppliers. Overall, a booming immersive technology consumer market is crucial to the adoption of the technologies in corporate L&D.

7 Results and conclusions

This chapter introduces the key findings of the thesis, assesses the validity of the results and discusses the limitations of the thesis. In addition, future research topics are reviewed in this chapter.

7.1 Key findings

The purpose of this thesis was to identify e-learning industry trends and uncertainties that will shape the future of corporate e-learning, to form scenarios for corporate e-learning over the next 10 year time frame, and to find the opportunities in which corporations will utilize outsourced services for learning and development. Below, we will discuss the findings for each research question in detail.

> R1. What are the trends and uncertainties that shape the future of corporate e-learning?

One important finding in the thesis is that e-learning will continue to serve as an essential part of corporate learning strategies. As the generation of digital natives increases its presence in the workforce, the use of technology in learning is only expected to strengthen its position. The fast-paced knowledge economy of today drives the emphasis of lifelong learning. This will, in turn, drive the future of corporate e-learning to contain more learning through timely informal approaches.

Both informal and formal corporate e-learning are being driven by e-learning technology trends. Most importantly, the increase of learning analytics will pave the way for adaptive learning solutions. A further key finding was that there is substantial interest in immersive learning and its future possibilities that have the potential to change the way corporate e-learning is implemented. E-learning for both formal and informal corporate learning is already taking its first steps toward these future directions.

Two key uncertainties were identified in the thesis work for the future of corporate e-learning. *Corporate knowledge sourcing focus* describes the future focus of sourcing strategies for corporate e-learning. This uncertainty also reflects on the products and services that are in corporate demand from external suppliers. In contrast, the *e-learning supplier power position* uncertainty addresses the formation of suppliers with centralized power in the e-learning industry, specifically, power that is established through brand, accreditation and control of fundamental parts of the e-learning value chain.

> R2. What are the scenarios for corporate e-learning over the next 10 year time frame?

The scenario planning process established future scenarios by identifying key uncertainties and key trends occurring in the global corporate e-learning industry. The different combinations of the key uncertainties resulted in four scenarios that presented alternative futures.

The first scenario, *expert corporations*, describes an ecosystem in which corporations are focused on building proprietary knowledge in-house. This shifts emphasis of e-learning products to platform and service suppliers that support the corporate in-house

knowledge mission. The *external power-players* scenario depicts an opposite world. In this scenario, corporate e-learning ecosystem has consolidated and strategic partnerships have been formed between e-learning players giving rise to suppliers with considerable market power. The vast service offerings and accreditation of power suppliers results in an ecosystem where corporations and suppliers in a power position grow together.

The two remaining scenarios depict variations of the two scenarios above. The *branded supplier collaboration* scenario depicts a similar environment to the *expert corporations* scenario, but suppliers in the ecosystem have consolidated and partnered resulting in suppliers with considerable power positions. These central suppliers dominate the market for products and services that support corporations in their specific needs surrounding in-house knowledge development. In contrast, the *open and flat* scenario presents a vibrant market with no central power positons. The demand for various learning technologies, approaches and the different preferences of corporations' generates a versatile e-learning market with various suppliers of all shapes and sizes.

The corporate e-learning scenarios draw out a common factor. E-learning niches will continue to provide a viable option for new business opportunities. Thus, an additional niche scenario was formed around immersive learning technologies to identify underlying events in these scenarios. The key uncertainties in these scenarios were *corporate adoption of immersive learning technologies*, reflecting on the general acceptance that the technologies experience in the corporate e-learning market. In addition, the *e-learning supplier power positions* uncertainty was selected to address the emergence of a key player in the immersive learning technology sector.

Elaboration of these niche scenarios revealed that technology enablers have a crucial role to play in the emergence of these technologies. The formation of a sustainable and profitable ecosystem around the technologies will initially have potential to drive consumer adoption. Through consumer adoption, we can expect these technologies to gain traction in corporate learning as well.

> R3. What are the opportunities in which corporations will utilize outsourced services for learning and development?

The scenario work finds that the e-learning market will continue to house a range of corporate training preferences and approaches through the interaction of trends and uncertainties. Small suppliers can respond to the key uncertainties in scenarios by identifying opportunities in specific market niches. This niche must require the presence of distinct competencies or specialization in certain technology. Overall, competencies and specialization should focus in areas that are less viable options for corporations to invest time, resources and money in-house. Focus on custom content in a specialized niche will help counter competition from other suppliers and differentiate from the saturated market of general offerings. Specialization highlights the importance of suppliers capturing and retaining essential internal competencies for both asynchronous and synchronous e-learning development and delivery.

Immersive learning technologies were identified as a market gaining traction. There are still substantial uncertainties on the future of the technologies in corporate learning. Due to the immaturity of the technology, opportunities and use cases in the market are still forming. The key finding is that these technologies, for one, offer possibilities for providing a new age of interactive learning experiences. These technologies also have the potential to address corporate learning trends, such as informal, on the job, social and collaborative learning approaches. Immersive learning technologies are one area

that allow external suppliers to seize opportunities that emerge from specialization, as discussed above. Additionally, immersive learning technologies are e-learning products that require a learning curve for efficient development, so in-house knowledge sourcing in this technology niche is also less likely to occur early on in the market. Overall, this niche addresses the key uncertainties found in the thesis work. Even so, it will take time for rigid corporations to realize what benefits the technology offers, increasing initial risks to suppliers.

7.2 Discussion and assessment of results

Altering the scope of the thesis or modifying the research questions provides opportunities for qualitative sensitivity analysis. If the studied time frame is set to 5 years, we can expect to see that e-learning supplier power positions and substantial shifts in knowledge sourcing focus uncertainties are much less probable to occur. As corporations are rigid to change, this reflects directly on a shorter timeframe resulting in a smaller likelihood of change occurring. The same can be said of trends related to corporate learning. Technological trends, such as gamification and mobile learning will yet to be established as widely used conventions in corporate learning. Likewise, lifelong learning and emphasis on informal methods will have a smaller impact over a shorter time frame and the expected increase of informal training over formal methods will be smaller.

On the other hand, if the scope were shifted to 15 years, we could expect some uncertainties to already have been realized, and their future trajectory will have been determined, such as the boom or bust of immersive learning technologies. A longer time frame would also allow industry consolidation to take place to a greater extent. As a fragmented market can be expected to consolidate over longer periods of examination, this could give the *centralized e-learning supplier power positions* uncertainty more merit. However, when expanding the time frame of scope, one must also consider increased uncertainty. For example, the event of disruptive innovation can form an entirely new value chain around e-learning, rebooting the industry. Consequently, the scenarios in this thesis would be inapplicable to this path of events.

Trends and uncertainty sensitivities can also be studied by altering the focus of the thesis between different business sectors or countries. By narrowing the thesis scope to the aviation industry, we could expect to find that the new age of immersive learning technologies is not an uncertainty at all, but a technology trend. Similarly, in the ICT sector we can find that in-house sourcing is used more than in corporations generally, strengthening the impact of the *in-house corporate knowledge sourcing focus* uncertainty.

The trends and uncertainties were studied on a global level. However, during scenario construction the perspective of the key stakeholder is already considered. This makes the direct adaptation of the scenarios for other stakeholders unfeasible. However, the overall aim to describe global scenarios in the thesis work does allow for elements, such as trends, to be applied to other perspectives. The sheer complexity and regional variations of the corporate e-learning market were found to be vast over the thesis work in both interviews and the literature review. This can result in the formation of blind spots when generalizing market characteristics and events. Additionally, certain market areas have lower emphasis in the thesis which may further contribute to blind spots in

analysis. This must be considered when assessing the results. Overall, statistical analysis of the scenarios was left out of the scope of the thesis and for this reason, no probabilities were set for the different scenarios.

The scenarios were formed into black and white outcomes. However, in the real world, the uncertainties are not constrained to absolute extremes and their influence may not be globally applicable. As the e-learning market characteristics vary vastly between business sectors, countries and regions, scenarios could potentially co-exist in different markets simultaneously. Overall, if the scenarios have captured the essential uncertainties and trends, the future market of corporate e-learning and the ecosystem surrounding it can be portrayed by a scenario introduced in this thesis, or more probably a combination of elements from multiple scenarios. Disruptive innovation was not considered and the thesis communicates an ecosystem portrayed by continuous innovation.

Due to the broad scope of the thesis, the paths and turning points of the industry are not fully determined. Technical precision of the thesis work is limited due to the general framing of the research questions. Technology specific analyses are for future research. The scope of the thesis also gave less attention to potential future events that cannot be directly addressed by the key stakeholder. These include, for example, establishing a deeper understanding in events, such as the emergence of a centralized market power positions or evaluating the consequences of strategic partnerships between suppliers. Furthermore, elaboration of the key stakeholder's strategic position was not a part of the thesis work.

All the interviewees are situated in Finland which limits the scope of the data gathered for the thesis. We must also consider that data may be biased with regard to issues that each participating expert feels are important. Two interviewees specifically stated that their expertise was more in the area of e-learning in higher education and not directly in corporate e-learning, which must be considered in the collected data. Over the interviews, trends and uncertainties were identified in both developed and emerging markets. However, after post-assessment of the gathered data, the weight was towards mature e-learning markets, which limits the overall global application of scenarios.

No clear e-learning market equilibrium state was found to exist within the 10 year time frame. The contribution of the thesis work was to deliberate events in the e-learning market and to introduce factors that influence the scenarios for the next 10 year time frame. The extent of scenario planning was not to predict the future, but to introduce scenarios through the interaction of trends and uncertainties that could otherwise be ignored by the key stakeholder. The overall objective was to establish a basis for further internal strategic thinking and to help managerial decisions.

7.3 Future research

The thesis overviewed historical advancements of e-learning, introduced an outlook on the current e-learning market and proposed a variety of scenarios through the use of trends and uncertainties that affect e-learning in corporate learning and development. This big picture approach calls future research to examine topics with a far narrower scope.

The specific evolution paths or turning points in corporate e-learning offer a topic of future research. This can be obtained by shifting the scenario analysis to address various stakeholders or focusing specifically on the point of need. The limited amount of data obtained directly from corporate L&D experts introduces a topic of future research. Here, focus can be narrowed down to the perspective of a corporation in a specific industry or country, allowing for a deeper analysis. Perspectives from technology enablers, platform providers and standardization bodies also offer future research possibilities to deepen understanding of the interests of other stakeholders in the ecosystem. The e-learning consumer market also offers an interesting field for future research. As discussed in the thesis, the events in this market have a high potential to influence the corporate e-learning market.

Future research can focus on a specific macro-environmental area of e-learning. Economic, social or political viewpoints could offer potential for future research. Cost-benefit, cost-effectiveness and social return on investment analysis offer formal approaches that can be used to examine the impact of e-learning in corporations.

In the interest of the key stakeholder, internal research, customer specific research and competitor research could be the focus of future research. Methods, such as SWOT analysis can deepen understanding on external, but also internal factors affecting opportunities and threats. Quantitative research was not a part of this thesis, but could be included in future research. Predicting the rate of change was challenging in the thesis. Modelling scenarios based on historical data and extrapolating results for the future could be used to gain an indication of the extent of change that could occur over a certain time period.

This thesis acknowledges, but does not further evaluate the implications of pedagogy in the various technologies and approaches in e-learning. Although research is available in the field of e-learning and pedagogy, new areas of research are emerging as new technologies are experimented in education and corporate training.

Overall, technology has the potential to alter society and education. The almost outdated term e-learning continues to evolve as various technologies and approaches to learning. The scenarios in the thesis produce an eventful future for e-learning. However, as scenarios are limited to a finite set of data, the real-life events corporate e-learning offer the center stage for the study of the industry’s evolution.

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Appendices

Appendix A List of interviewees

Head of Learning Solutions, Educational institution

Learning designer, Educational institution

Professor, Dept. of Information Technology

Training consultant, Entrepreneur

HR Manager & Financial Manager, IT Dept., Public sector

Professor, Dept. of Teacher Education

Appendix B Outline for interviews

Interview

Scenario analysis of e-learning

1. Interviewee background
   a. Education background
   b. Work history

2. E-learning as a term
3. E-learning trends
   a. Political, economic, social/cultural, technological
   b. E-learning industry trends
   c. Corporate trends, trends in corporate HR

4. E-learning uncertainties
   a. Political, economic, social/cultural, technological
   b. Demand / supply uncertainties
   c. Industry challenges

5. Additional questions